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THE
JOURNAL OF MALACOLOGY.

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CONTENTS OF VOLUME XI.

	PAGE.
Notes on <i>Thersites</i> (<i>Hadra</i>) <i>bellenkerensis</i> , Braz., and <i>beddomeae</i> , Braz. By HUGH FULTON.	1
A Critical List of the <i>Sphoerospira</i> Section of <i>Thersites</i> . By HUGH FULTON. (Plate i.)	2
Notes on the Anatomy of the Generative Organs of <i>Ariophanta</i> <i>juliana</i> , Gray By H. OVERTON. (Illustrations.) . . .	12
Notes on Slugs and Slug-like Molluscs. By WALTER E. COLLINGE, M.Sc..	14
On a collection of Marine Shells from Port Alfred, Cape Colony. By EDGAR A. SMITH, I.S.O. (Plates ii, iii.)	21
Note on <i>Corilla erronella</i> , Nev., MS. By G. K. GUDE, F.Z.S. (Illustrations.)	45
Description of a new species of <i>Ariunculus</i> from Algeria. By WALTER E. COLLINGE, M.Sc.	47
Some Recent Slug Papers. By D. F. HEYNEMANN. . . .	48
Note on <i>Testacella haliotidea</i> , Drap. By the REV. A. H. COOKE, M.A.	49
Note on <i>Parmacella deshayesi</i> , Moq.-Tand. By WALTER E. COLLINGE, M.Sc.	49
On some new species of <i>Melania</i> and <i>Jullienia</i> from Yunnan and Java. By HUGH FULTON. (Plate iv, figs. 1—5.) . . .	51
On a collection of Land Shells from Gebi Island, Moluccas, with descriptions of new species. By HUGH FULTON. (Plate iv, figs. 6—11.)	53

Note on <i>Leptopoma crenulabre</i> , Strubell. By HUGH FULTON. (Plate iv, figs. 12, 13.)	55
On certain deposits of semi-fossil shells in Hamakua district, Hawaii, with descriptions of new species. By Professor H. WETHERBEE HENSHAW. (Plate v, figs. 1—8.) . . .	56
Report on semi-fossil Land Shells found in the Hamakua district Hawaii. By C. F. ANCEY. (Plate v, figs. 9—23.) . . .	65
Descriptions of some new species of Cingalese and Indian Marine Shells. By H. B. PRESTON, F.Z.S. (Plates vi, vii.) . . .	75
Descriptions of Twelve new species and one variety of Marine Gastropoda from the Persian Gulf, Gulf of Oman, and Arabian Sea, collected by Mr. F. W. Townsend, 1902—1904. By JAMES COSMO MELVILL, M.A., F.L.S. (Plate viii.) . . .	79
Note on <i>Mitra stephanurha</i> , Melv., with description of a proposed new variety. By JAMES COSMO MELVILL, M.A., F.L.S. (Plate viii, figs. 16, 17.)	86
On some Non-Marine Shells from the Austro- and Indo-Malayan Regions. By E. R. SYKES, B.A., F.L.S. (Plate ix.) . . .	87
The Helicoid Land Shells of Asia. Corrections and Additions. By G. K. GUDE, F.Z.S.	93
Note on Two varieties of <i>Arion eulfuscus</i> , Drap. By WALTER E. COLLINGE, M.Sc.	98
Proceedings of the Midland Malacological Society.	15
Current Literature.	16, 50, 72, 98
Editor's Notes	20, 100

LIST OF ILLUSTRATIONS IN VOLUME XI.

	PAGE
Species and Varieties of <i>Thersites</i> . Plate I.	10
<i>Ariophanta juliana</i> , Gray. Terminal ducts of the generative organs.	12, 13
<i>Ariophanta juliana</i> , Gray. Dissection of dart-sac.	14
<i>Ariophanta juliana</i> , Gray. Incompletely formed spermatophore.	14
New species of South African Marine Shells. Plates II and III.	44
<i>Corilla erronella</i> , Nev., MS.	45
New species of Land and Freshwater Shells. Plate IV.	55
New semi-fossil Hawaiian Land Shells. Plate V.	71
New Indian and Cingalese Marine Shells, Plates VI and VII.	78
New Gastropoda from the Persian Gulf. Plate VIII.	85
Non-Marine Shells from the East Indies. Plate IX.	92



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VOL. XI.

NOTES ON THERSITES (HADRA) BELLENDENKERENSIS,
BRAZ., AND BEDDOMAE, BRAZ.

BY HUGH FULTON.

Having examined an authentic specimen of *beddomae*, Braz., from the collection of the late Capt. C. E. Beddome, I have no hesitation in placing it as a variety of *bellenulkenkerensis*, Braz., a species that is most variable in size and form. The variety *beddomae* is thinner, generally more depressed, and the minute zigzag sculpture is more distinct, being just discernable (on fresh specimens) without a lens.

The specimen mentioned above is of similar dimensions to the type, but two other specimens before me, one of which was collected together with *bellenulkenkerensis* in Queensland by Emil Weiske, the other being in Dr. Cox's collection and labelled *bellenulkenkerensis*, are more depressed, viz. :

maj. diam. : 41 ; alt. 30. (Coll. Weiske).

„ „ 38 ; „ 28. (Coll. Dr. Cox)

The original figure of *bellenulkenkerensis* in the Proc. Zool. Soc., 1875, t. 4, f. 4 and copied in Tryon's Manual, vol. vi, pl. 34, fig 1 does not agree with the dimensions given in the description, viz. : Alt. 17, greater diameter 22, lines (= Alt. 36, maj. diam. 45 millim.) whereas the figure measures, alt. 45, maj. diam. 44 millim.

Judging from specimens I have examined the figure is out of proportion, being much too high in proportion to its diameter.

A CRITICAL LIST OF THE SPHOEROSPIRA SECTION OF THERSITES.

By HUGH FULTON.

(Plate i.)

The collections of Dr. James C. Cox of Sydney, and of the late Capt. C. E. Beddome, both rich in specimens of this group, having passed through my hands, I have had the opportunity of examining many typical specimens, and thought a critical list might be of some service.

One great difficulty in working out this group has hitherto been the lack of authentic material, so many of the species having been founded upon such slight characters, that without one had for comparison actual types or co-types, it was quite impossible to identify specimens with any certainty from descriptions. Fortunately, the collections mentioned above contained many co-types, especially of the forms described by John Brazier of Sydney, whose descriptions, often without figures, and very rarely with comparative notes, generally indicate but characters common to the whole group.

It is probably owing to lack of authentic material at his disposal, that Dr. H. A. Pilsbry's comparatively recent monograph in Tryon's Manual is not up to his usual excellent form; his division of the section into perforate and imperforate species is not a natural one, for example, *andersoni*, Cox, occurs both perforate and imperforate, and the same thing occurs in other species of the group.

In this list I have endeavoured to arrange the various forms according to their relationship and have added notes upon their distinguishing characters.

I am greatly indebted for valuable assistance to Col. Beddome, Dr. James C. Cox, Chas. Hedley, Esq., John Ponsonby, Esq., and Edgar A. Smith, Esq.

GROUP OF *incei*, Pfr.

1.—*T. incei*, Pfr.

- P.Z.S., 1845, p. 126; Cox's Monog. Aust. L. Sh., pl. 5, fig. 5.
= *challisi*, Cox: P.Z.S., 1873, p. 565, pl. 48, fig. 3.
= *appendiculata*, Pfr.: P.Z.S., 1854, p. 149; Cox: Monog. Aust. L. Sh., pl. 5, fig. 11.
= *thatcheri*, Cox: P.Z.S., 1870, p. 170, pl. 16, fig. 2.
= *hanni*, Braz.: Proc. Linn. Soc. N.S.W. (i), 1876, p. 97.
= *hilli*, Braz.: P.Z.S., 1875, p. 32, pl. 4, fig. 3.
= *johustonei*, Braz.: P.Z.S., 1875, p. 32, pl. 4, fig. 2.
= *bayensis*, Braz.: P.L.S., N.S.W. (i), 1872, p. 2.
= *praetermissi*, Cox: Monog. Aust. L. Sh., p. 111, pl. 20, fig. 13.
Loc.—Queensland.

Types of *incei* and *appendiculata* in British Museum.

Compared with the type of *incei*, typical *appendiculata* is a little flatter in form, *thatcheri* a little broader, *hilli* smaller and more conical; *johnstonei* same form as *hilli*, but larger; *bayensis* is simply a thicker form of *appendiculata*, *praeternissi* is the lighter coloured variety with no circum-umbilical brown patch, but that character is not constant.

I have not seen a specimen of *challisi*, but judging from the description and figure, it is evidently almost identical with typical *incei*.

The foregoing comparisons are made from typical specimens, but they are closely linked together by intermediate forms, proving that they belong to one species.

Pilsbry, in Tryon's Manual of the Mollusca, vol. vi, p. 167, had evidently not a typical specimen of *incei* before him, but rather one of the varieties, as he distinguishes it by the absence of the brown circum-umbilical patch, a character that is present in the type specimen of *incei*.

T. *incei* v. *yepponensis*, C. E. Beddome.

Proc. Linn. Soc. N.S.W., 1897, vol. xxii, p. 123. figd.

Loc—Yeppon, near Rockhampton, Queensland.

A lighter-coloured shell, and with the umbilicus more excavately open than in typical *incei*.

2—T. *lessoni*, Pir.

Pfr. Sym., 1846, iii, p. 71; Reeve: Con. Icon., fig. 754.

= *seminigra*, Morelet: Journ. de Conchyl., 1864, p. 289.

= *parsoni*, Cox: P.Z.S., 1872, p. 18, pl. 4, fig. 2.

Loc.—Queensland.

Types in British Museum.

The types of *lessoni* and *parsoni* represent the extremes of this species, the former being very small and somewhat depressed, whereas the latter is larger and rather higher in the spire than usual. Although *lessoni*, by reason of its dark brown colour, white peristome, and absence of spiral bands on the lower whorls, is readily separable from *incei*; yet it agrees so closely in other respects, that I am doubtful as to whether it can be anything more than a colour variety of that species. The earlier whorls are lighter in colour and the middle ones have generally two or three narrow spiral bands.

T. *lessoni* v. *aureedensis*, Brazier.

P.Z.S., 1871, p. 640; Tryon's Man. of Conch., vol. viii, p. 282, pl. 54, figs 7-9.

Loc—Yeppon, near Rockhampton, Queensland.

Type in Australian Museum.

Very similar above to *lessoni* in form and coloration, but slightly flatter below and with a broad light-yellowish circum-umbilical patch; the triangular dilated portion of the peristome at the point of insertion is white, whereas in *lessoni* it is of a brownish colour.

T. lessoni v. **lutea**, n. var.

Pl. 1, fig. 4.

Loc.—N. Queensland.

Same form as *lessoni* v. *aureolensis*, but of a light-yellowish colour. Of three specimens before me one is entirely bandless, but the other two have the narrow light-brown spiral bands on earlier whorls, the same as one finds on most specimens of *aureolensis*.

3.—T. curtisiana, Pir.

P.Z.S., 1863, p. 528.

= *bala*, Braz.: Proc. Linn. Soc. N.S.W. (iii), 1878, p. 78, pl. 8, fig. 4.*Loc.*—Townsville and Magnetic Is., Queensland.

Somewhat like *lessoni* in form and coloration, but the whorls increase rather more rapidly in size, it has half a whorl less, the aperture is not quite so broad, the peristome is less dilated at the point of insertion and of a light reddish-brown colour, not white as in *lessoni*.

4.—T. andersoni, Cox.

P.Z.S., 1871, p. 644, pl. 52, fig. 4.

Loc.—Rockhampton, Queensland.

Type in British Museum.

This species is most variable in size; of the twenty before me the following are the dimensions of four specimens:—

Alt. 15, maj. diam. 27 millim.

Alt. 18, „ „ 26 „

Alt. 21, „ „ 33 „

Alt. 26, „ „ 30 „

Some specimens are quite imperforate, but more commonly it is more or less perforate.

Pilsbry in Tryon's Manual, vol vi, p. 172, pl. 39, figs. 82 and 83, describes and figures perforate specimens of this species as *yulei*, but gives a figure of the true *yulei* on plate 23, figures 65 and 66.

Andersoni can be separated from *incei* by its thinner substance, its less oblique, less expanded, and, brown peristome, it is also less openly umbilicated and has half a whorl less,

From *yulei* it can be distinguished by its lighter coloration and narrower bands above, its narrower umbilicus and much less expanded peristome.

5.—T. yulei, Forbes.

Appendix Voy. "Rattlesnake," 1852, p. 377, pl. 2, fig. 6.

= *rainbirdi*, Cox: P.Z.S., 1870, p. 170, pl. 16, fig. 1.*Loc.*—Queensland.

Types in British Museum.

The types of *yulei* and *rainbirdi* are extreme forms, the type of *yulei* being a small light-coloured, and depressed form, whilst the type of *rainbirdi* is large, globose, and darker-coloured; the very large series before me closely connects these two forms.

The broadly-expanded, dark-brown peristome and excavated umbilicus, differentiates this form from its allies.

GROUP OF *frazieri*.

6.—**T. frazeri**, Gray.

Zool. Beechey's Voy. Moll., 1839, p. 143, pl. 38, fig. 6.

= *mossmanni*, Braz. : P.Z.S., 1875, p. 33, pl. 4, fig. 6.

Loc.—New South Wales and Queensland.

This species varies greatly in size and coloration; a specimen before me is of a light yellowish-brown with only one colour band, situated at the suture of the lower whorls; another has an additional one at the periphery of the last whorl, whilst others are nearly covered with dark brown spiral bands. The colour of the peristome varies from black to a light bluish-grey.

Some of the larger forms approach *informis*, Mouss., but the latter can be readily separated by its higher spire and more rapidly increasing whorls.

The shell described as *mossmanni* is a rather globose form of *frazieri* with a black peristome; the original figure is misleading, being much higher in proportion to width, according to the dimensions given in the description.

T. frazeri v. **flavescens**, Hedley.

I have not seen this remarkable variety said to be "of a uniform light yellow, lip pure white."

Loc.—Corumbui Creek, Queensland.

7.—**T. rawnesleyi**, Cox.

P.Z.S., 1873, p. 564, pl. 48, fig. 2.

Loc.—Mt. Elliott, Queensland

A heavy form of a uniform dark brown, with a thick and broadly expanded peristome.

T. rawnesleyi v. **mazee**, Braz.

Proc. Linn. Soc. N.S.W., 1878 (iii), p. 79, pl. 8, fig. 5.

Loc.—Rockingham Bay, Queensland.

From typical *rawnesleyi* this differs chiefly in coloration, having numerous dark-brown spiral bands upon a light yellowish-brown ground; it varies greatly in size and resembles *frazieri*, but can be separated by the thicker peristome and smaller aperture.

All the *frazieri* group have the microscopic waved striation, although it is almost obsolete in some specimens.

In *frazieri* there are generally on the middle whorls more or less conspicuous (under a strong lens) microscopic spiral impressed lines, which I have not seen on specimens of *mazee*.

8.—T. rockhamptonensis, Cox.

P.Z.S., 1873, p. 150.

= *moresbyi*, Angas : P.Z.S., 1876, p. 267, pl. 20, figs. 8, 9.*Loc.*—Rockhampton, Port Denison, Queensland.

A solid form somewhat similar to *rauenesleyi* var. *mazee* in coloration but readily distinguished by its *flat base* and its thinner and darker coloured peristome.

Moresbyi was described from an elevated specimen of *rockhamptonensis*.

T. rockhamptonensis v. **pallida**, Hedley & Musson.

Proc. Linn. Soc. N.S.W., 1891, p. 556.

Loc.—Rockhampton, Queensland.

I have not seen this shell, which is described as "bandless, of a tawny yellow colour." I thought my *lessoni* v. *lutea* was this variety and sent a specimen of that to Mr. Hedley, but he writes "your shell is quite different, the type specimen of *pallida* is an odd shell, I have seen none like it and now doubt if it is not an abnormal individual."

GROUP OF *whartoni*.**9.—T. bebias**, Brazier.

Proc. Linn. Soc. N.S.W. (iii), 1878, p. 78.

Loc.—Garden Is., Rockingham Bay, Queensland.

Almost identical with *whartoni* in general appearance, but the umbilicus is less open, some specimens being quite imperforate; may or may not have a circum-umbilical brown patch. The chief distinction between this and *whartoni* is the difference in the microscopic sculpture, the latter consists of closely-set, silk-like, slightly waved striae, whereas in *bebias* it is coarser and more granular.

10.—T. zebina, Brazier.

Proc. Linn. Soc. N.S.W., 1878, p. 78, pl. 8, fig. 2.

Loc.—Douglas River, Queensland

Type in Australian Museum, Sydney.

Very close to *bebias* but thicker, more globose, and its microscopic granulated sculpture is more conspicuous. It is said by Brazier to be imperforate, but I have a slightly perforate specimen before me.

11.—T. whartoni, Cox.

P.Z.S., 1871, p. 55, pl. 3, figs. 5, 5a.

= *mourilyana*, Braz. : P.Z.S., 1895, p. 31, pl. 4, fig. 1.*Loc.*—Port Denison, Queensland.

Type in British Museum.

A thin multi-banded shell approaching some of the varieties of *mulgravensis*, but distinguished by its microscopical sculpture, which consists of oblique, closely-set, slightly waved, almost straight striae; this sculpture is seen (under the lens) to be quite distinct from that of *bebias* and its allies.

12.—T. cookensis, Brazier.

Proc. Linn. Soc. N.S.W. (i), 1875, p. 17.

= *tomsoni*, Braz. : P.L.S.N.S.W. (i) 1876, p. 97.

= *cookensis*, Braz. : Tryon's Man. of Conch., vol. vi., p. 97.

Loc.—Gould Is., Rockingham Bay, and Frazer's Is., Queensland (not Cooktown, *vide* Brazier).

This has the same microscopic sculpture as *bebias*, but is smaller, darker-coloured, the aperture not quite as broad and slightly less oblique. The shell is of a somewhat thicker substance, and the colour bands do not show clearly through the aperture as in *bebias*, the interior being almost opaque whitish; the peristome of *cookensis* is also thicker and darker in colour.

13.—T. mulgravensis, Brazier.

Pl. 1, fig. 1.

P.Z.S., 1872, p. 21.

= *mulgravei*, Braz. : Proc. Roy. Soc. Queensland, 1889, p. 101.

Loc.—Palm Is., N.E. Australia.

With regard to this species, figured here for the first time, there must, I think, have been some error in the dimensions given, viz., alt. 1 in. 1 line : greater diam. 2 in. 4 lines. (Alt. 27 ; diam. 58 millim). A shell of these dimensions would be a most remarkable form for this group. A specimen from the collection of the late Capt. C. E. Beddome of Tasmania, who had many shells named by Brazier, measuring alt 32 ; maj. diam. (including peristome) 34 millim., answers better to Brazier's description, "turbinate globose."

Since writing the above Mr. Charles Hedley has been kind enough to measure the type specimen in the Australian Museum and gives the following dimensions : alt. 30 ; maj. diam. 38 millim.

I have only seen one specimen.

T. mulgravensis v. palmensis, Brazier.

Pl. 1, fig. 5, 6.

Proc. Linn. Soc. N.S.W. (i), 1876, p. 105.

Loc.—Palm Is., Queensland.

An extremely variable form, the typical specimens being solid and globose-conic whilst others are depressed and of thin substance, resembling *ichartoni*. The microscopic sculpture is the same as that of *bebias*, but *palmensis* is larger, has the umbilicus more open and is further distinguished by it uniformly coloured peristome (which may be dark or whitish) the colour-bands not extending to the edge as in *bebias*.

T. mulgravensis v. meridionalis, Brazier.

Pl. 1, fig. 7, 8.

Proc. Linn. Soc. N.S.W. (i), 1880, vol. 5, p. 458.

Loc.—Palm Is., Queensland.

Described from a young specimen, adult specimens being thicker, and the peristome lighter in colour.

This uniform yellowish variety with a narrow sutural dark-brown band, occurs also with a narrow band, at the periphery of last whorl.

GROUP OF *blomfieldi*, Cox.**14 —T. informis**, Mouss.

Journ. de Conchyl., 1869, p. 59, pl. 4, fig. 3.

Loc.—Port Mackay, Queensland.

The largest species of the group (see note under *frazieri*). A bandless variety occurs of a uniform dark brown with a narrow yellowish subsutural border.

15 —T. blomfieldi, Cox.

Catal. Aust. L. Sh., 1864, p. 19; Monog. Aust. L. Sh., 1868, pl. 1, fig. 1.

= v. *warroensis*, Hed. & Musson: Proc. Linn. Soc. N.S.W. 1891, p. 556, Viag. Magenta, pl. 2, fig. 5.

Loc.—Port Curtis, Queensland.

A distinct species, readily distinguished by its light-coloured earlier whorls, contrasting with the very dark-brown lower ones. Under a strong lens the lower whorls are seen to have more or less obsolete, numerous spiral impressed lines.

The variety *warroensis* is the lighter-brown variety, but specimens before me show various degrees between that and the darker typical colour.

16.—T. concors, n. sp.

Pl. 1, fig. 3.

= *parsoni*, Pils. (not Cox): Tryon's Man. of Conch., vol. vi., p. 162, pl. 35, figs. 11, 12 (not 13).

Shell sub-globose. solid. narrowly but deeply umbilicated, light-coloured above, with two narrow indistinct light-brown spiral bands on the middle whorls, last whorl of a very dark-brown, with a narrow conspicuous yellowish band at the suture; whorls $4\frac{1}{2}$, last descending in front. Aperture very oblique, rather dark within. Peristome moderately expanded, dark brown, triangularly dilated at point of insertion and partly covering the umbilicus.

Maj. diam. 35; alt 28 millim.

Loc.—Gayndah, Queensland.

This species is very like *blomfieldi* in coloration, but more compressed in form, the umbilicus is more open, and the peristome not so broadly expanded.

It is quite distinct from *curtisiana*, Pfr., although bearing a superficial resemblance to that species.

17.—T. croftoni, Cox.

P.Z.S., 1872, p. 18, pl. 4, fig. 1.

Loc.—Hydrometer River, Queensland.

Type in British Museum.

18.—T. coxi, Cro-sc.

Journ. de Conchyl., 1866, p. 195; Conchyl. Cab., p. 534, pl. 163, figs. 5, 6.

Loc.—Port Molle and Port Denison, Queensland.Although always easily separated, almost the only difference between *croftoni* and *coxi* is that of coloration.GROUP OF *macleayi*.**19.—T. oconnellensis**, Cox.

P.Z.S., 1871, p. 55, pl. 3, figs. 4, 4a.

Loc.—The O'Connell River, Port Denison, Queensland.

Type in British Museum.

A distinct form easily distinguished by its basal flatness (the spire varies greatly in height) and broadly excavated umbilical area.

20.—T. arthuriana, Cox.

P.Z.S., 1873, p. 564, pl. 41, figs. 1, 1a.

Loc.—L. Is., N. Queensland.

Nearest to the foregoing species, but lighter-coloured above, the last whorl is more rounded and the umbilicus not nearly so broadly excavated.

21.—T. gratiosa, Cox.

P.Z.S., 1871, p. 53, pl. 3, figs. 1, 1a.

Loc.—Whitsunday Is., Queensland.

Type in British Museum.

A distinct form, easily recognised.

22.—T. etheridgei, Brazier.

Pl. 1, fig. 2.

Proc. Linn. Soc. N.S.W. (ii), 1877, p. 25.

Loc.—Andromache River, N.E. Coast of Australia.

Type in Col. Beddome's collection.

Differs from *gratiosa* in having a white peristome and numerous yellowish spiral bands on lower part of the last whorl. It is probably only a variety of *gratiosa*. I have only seen two examples.**23.—T. macleayi**, Cox.

P.Z.S., 1864, p. 485, figs. 1—3.

Loc.—Whitsunday Is., and Port Denison, Queensland.Somewhat similar to *gratiosa* in form, but readily separated by its very different coloration.

GROUP OF *greenhilli*.24.—*T. greenhilli*, Cox.

Journ. de Conchyl., 1865, p. 46, ; Monog. Aust. L. Sh., p. 40, pl. 9,
fig. 1 and pl. 18, fig. 8.

Loc.—Upper Denison River, Queensland.

Closely allied to *sardalabiata*, from which it differs in being generally thinner, of a rounder form, darker in colour, and readily separated by its conspicuous (under the lens) microscopical granular sculpture.

Pilsbry, in Tyron's Manual of Conchology, places this under *Baustites*.

25.—*T. sarda'abiata*, Cox.

P.Z.S., 1871, p. 54. pl. 3, fig. 3.

Loc.—Mt. Dryander, Port Denison, Queensland.

Type in British Museum.

A light straw-coloured shell allied to *greenhilli*.

POSITION DOUBTFUL.

coarctata, Fér, Hist. Moll., pl. 106, figs. 6, 7.

Species placed under *Sphoerospira* by Pilsbry in Tyron's Manual of Conchology, but belonging to other sections.

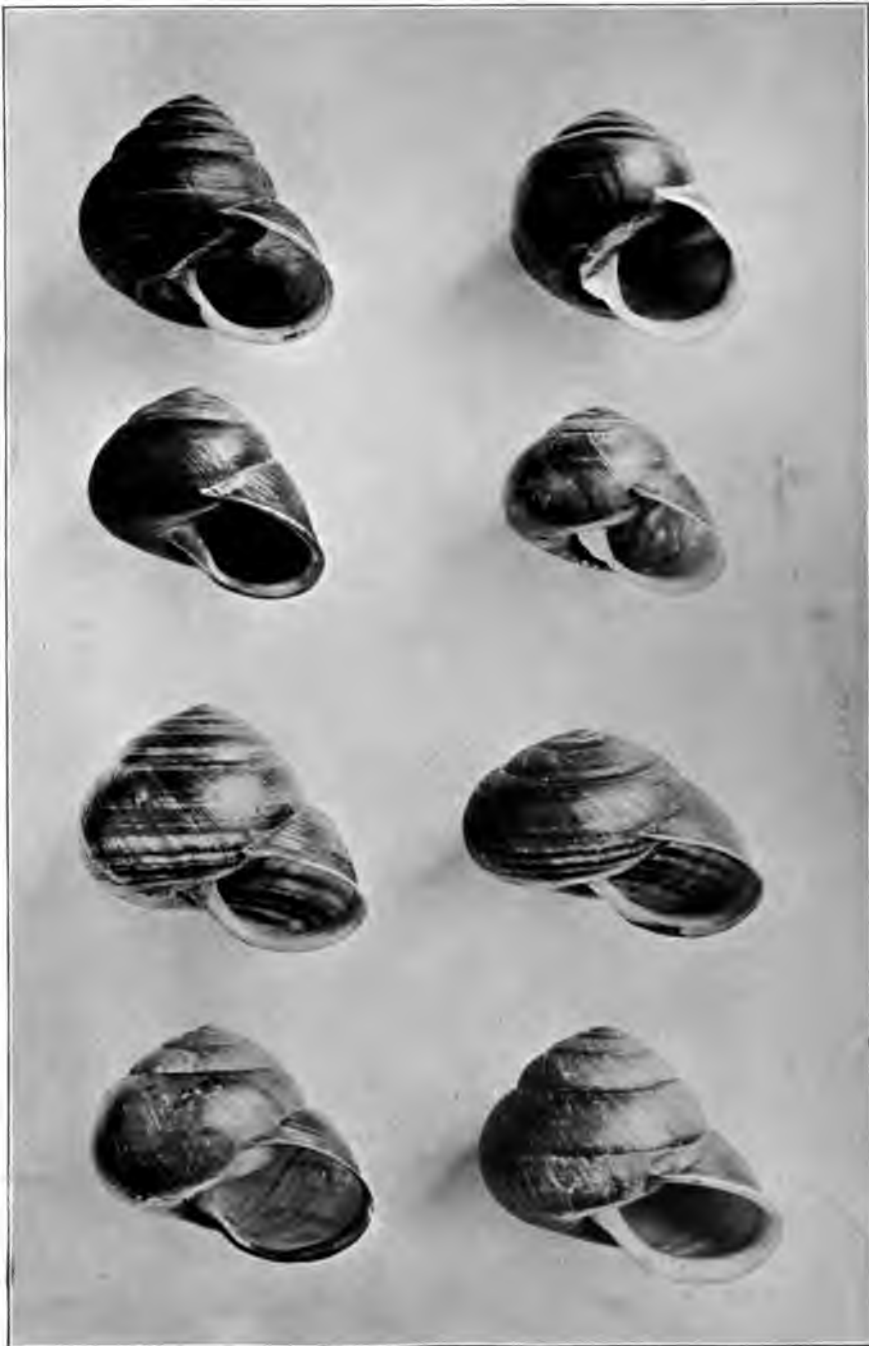
- barneyi*, Cox. (*Hadra*?).
- beiddoniae*, Brazier. (*Hadra*).
- bellenlenkerensis*, Brazier. (*Hadra*).
- broaultbenti*, Brazier. (*Sulcobasis*?).
- creeeli*, Cox. (Section?).
- hiconi*, Brazier. (*Papuina*).
- mitchellae*, Cox. (*Thersites*).
- nicomede*, Brazier. (*Hadra*).
- nesselensis*, Cox. (*Rhynchula*).

EXPLANATION OF PLATE I.

- Fig. 1. *Thersites mulgravensis*, Brazier.
 2. „ *etheridgei*, Brazier.
 3. „ *concora*, n. sp.
 4. „ *lessoni*, Pfr. var. *lutea*, n. var.
 5. „ *mulgravensis*, Brazier var. *palmensis*, Braz.
 Typical form.
 6. „ *mulgravensis*, Brazier var. *palmensis*, Braz.
 Depressed form.
 7. „ *mulgravensis*, Brazier var. *meridionalis*, Braz.
 8. „ *mulgravensis*, Brazier var. *meridionalis*, Braz.
 Banded.

The position of the figures are as under :

1	2
3	4
5	6
7	8



SPECIES AND VARIETIES OF THERSITES.



INDEX.

	No.		No.
andersoni, Cox	4	lutea, Fulton, = lessoni, var. ...	2
<i>appendiculata</i> , Pfr. = incei. ...		macleayi, Cox.	23
arthuriana, Cox	20	meridionalis, Braz. = mulgraven-	
aureedensis, Braz., = lessoni, var. 2		sis, var.	
<i>lala</i> , Braz., = curtisiana.		mittchellae, Cox. (page 10).	
barneyi, Cox. (page 10).		<i>moresbyi</i> , Angas, = rockhampton-	
bayensis, Braz., = incei.		ensis.	
bebias, Braz.	9	<i>mourilyana</i> = whartoni.	
beddomae = bellendenkerensis, var.		<i>mazee</i> , Braz., = rawnesleyi, var.	
bellendenkerensis, Braz. (page 10).		<i>mossmani</i> , Braz., = frazeri.	
blomfieldi, Cox.	15	mulgravensis, Braz.	13
broadbenti, Braz. (page 10).		nicomede, Braz. (page 10).	
<i>challisi</i> , Cox., = incei.		oconnellensis, Cox.	19
coarctata, Fér. (page 10).		pallida, Hed. & Mus., =	
concors, Fulton.	16	rockhamptonensis, var, ...	8
cookensis, Braz.	12	palmensis, Braz., = mulgravensis,	
coxi, Crosse.	18	var.	13
creedi, Cox. (page 10).		<i>parsoni</i> , Cox., = lessoni	
croftoni, Cox.	17	<i>praetermissi</i> , Cox., = incei	
curtisiana, Pfr.	3	<i>rainbirdi</i> , Cox., = yulei.	
etheridgei, Braz.... ..	22	rawnesleyi, Cox.	7
flavescens, Hedley, = fraseri, var. 6		rockhamptonensis, Cox. ...	8
frazeri, Gray.	6	sardalabiata, Cox.	25
gratiosa, Cox.	21	<i>seminigra</i> , Morelet, = lessoni ...	
greenhilli, Cox.	24	<i>thatcheri</i> , Cox., = incei.	
<i>hanni</i> , Braz., = incei.		<i>tomsoni</i> , Braz., = cookensis.	
<i>hilli</i> , Braz., = incei.		warroensis, Hed. & Mus., =	
hixonii, Braz. (page 10).		blomfieldi, var.	
incei, Pfr.	1	wesselensis, Cox. (page 10).	
informis, Mouss	14	whartoni, Cox.	11
<i>johnstonei</i> , Braz., = incei.		yepponensis, Beddome, = incei,	
lessoni, Pfr.	2	var.	
		yulei, Forbes.	5
		zebina, Braz.	10

NOTES ON THE ANATOMY OF THE GENERATIVE ORGANS OF ARIOPHANTA JULIANA, GRAY.

By H. OVERTON,

Sutton Coldfield, Warwick.

The specimens which have furnished the following account are some that were collected by the late Mr. Oliver Collett at Galle, Ceylon.

The position of this species in the genus *Ariophanta*, I do not, at present, propose to discuss; like many other members of the genus far too little is known of its internal structure, in fact there is a striking absence of any thorough and detailed statement of the anatomical characters of this genus. Semper (Reisen Arch. Philip. 1870) has given short descriptions of certain organs in different species, and Lieut-Col. Godwin-Austen has still more briefly referred to the generative organs of various species, but his remarks together with the indistinct nature of the drawings illustrating them, are almost useless for purposes of comparison, indeed, it is difficult to attach any serious value to them whatever.

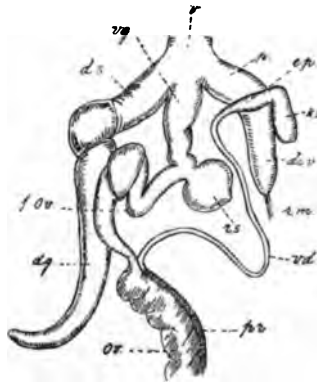


Fig. 1.—Generative Organs, as seen when separated from the external generative orifice.

REFERENCE LETTERS.—*div.* Diverticulum of penis. *dg.* Dart gland. *ds.* Dart-sac. *ep.* Epiphallus. *fo.* Free-oviduct. *ks.* Kalk-sac. *os.* Oviduct. *p.* Penis. *pr.* Prostate. *r.m.* Retractor muscle. *r.s.* Receptaculum seminis. *v.* Vestibule. *v.d.* Vas deferens. *vg.* Vagina.

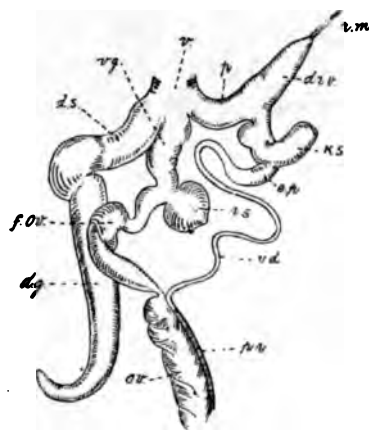


Fig. 2.—Generative Organs, with the penis, etc., turned on one side. Lettering as in Fig. 1.

Externally the generative orifice opens into the vestibule into which the penis opens posteriorly and dorsally, the dart-sac anteriorly and ventrally, and the vagina in the middle.

The vagina is a moderately long tube-like duct, having its internal wall thrown into four longitudinal plications, which are continued into the free-oviduct. At the opening of the receptaculum seminis they form a series of serpentine folds, beyond which they run in a straight series for a short distance, and then in the bulbous portion of the free oviduct they become more numerous and rise up in a very prominent manner. The receptaculum seminis is a heart-shaped sac, and sessile. The penis is a large muscular organ with a thick-walled muscular diverticulum, at the apex of which is the retractor muscle. At the junction of the penis and diverticulum the kalk-sac is given off. This sac is a large muscular body, with smooth internal walls, and in one specimen contained a hard calcareous body measuring 2 by .7 millim., which in all probability was a spermatophore incompletely formed. From the anterior end of this sac the epiphallus is given off, which leads to the narrow vas deferens. The dart-sac is a large muscular tube, and contains a small fleshy dart, which exhibits a concentric ribbing.

Judging from the generative organs this species seems to be nearer to *Euplecta*, Semper, than to *Ariophanta*, s.s.

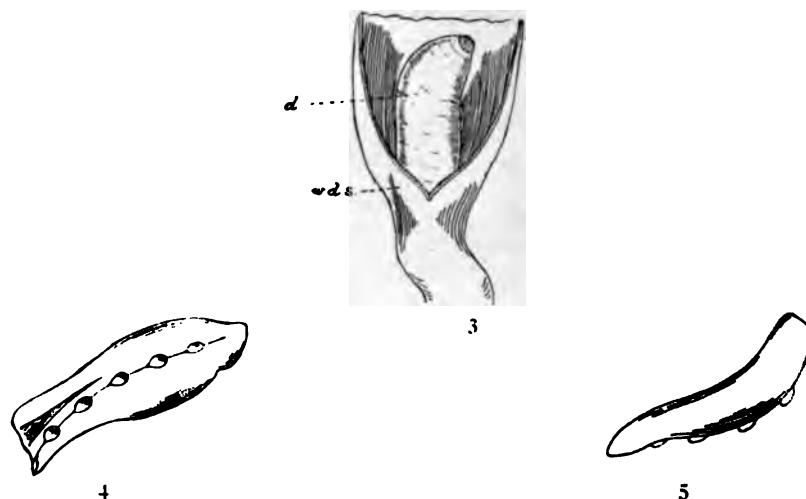


Fig. 3.—Dissection of dart-sac to show the fleshy dart.
Figs. 4 and 5.—Dorsal and lateral views of incompletely formed spermatophore.
REFERENCE LETTERS.—*d*. Dart. *w.d.s.* Wall of dart-sac.

NOTES ON SLUGS AND SLUG-LIKE MOLLUSCS.*

By WALTER E. COLLINGE, M.Sc.

5 —On a new and interesting genus of Slugs.

Some short time ago I received from Professor Plate of Berlin, a very interesting collection of slugs, numbering upwards of a hundred specimens, mostly belonging to the genus *Veronicella*, Blainville. Amongst these are three slugs, which at first sight I thought belonged to the genus *Atopos*, Simr., but on opening the bottle in which they were contained with some specimens of *Veronicella*, it was at once evident that I had before me a slug which could not be referred to any known genus. Unfortunately Dr. Plate does not know where the specimens were collected: there is one large example and two much smaller specimens.

Externally the large specimen, which measures 75 millim., in length, looks somewhat like a unicoloured *Atopos*; it is a dirty sepia-brown in colour, very slightly keeled posteriorly, the tail end attenuated and the foot-sole extending a little beyond the dorsum. On the sides of the dorsum are a series of seven or eight obliquely directed grooves, rising from the perinotum, and as these pass in a backward direction on the sides of the dorsum they divide in a dendritic manner into finer grooves. The generative orifice is situated on the right side, close to the foot-sole and 44 millim. from the posterior end of the body. The teeth of the radula are as in *Veronicella*.

* See ante, 1903, vol. x, p. 17.

6.—*Arion subfuscus* from the Orkney Isles.

I am indebted to the kindness of Dr. Geo. E. Allan, for a peculiar specimen of *Arion subfuscus*, Drap., collected by him in the Orkney Isles during the summer of 1903.

Externally the specimen is much darker in colour than those usually met with, and the foot-sole and foot-fringe are a light-brown, the former without lineoles.

Internally the chief differences from the normal condition are confined to the generative organs. The typical appearance is so well-known that I need not here describe it, beyond pointing out the very characteristic form which the free-oviduct exhibits in this species. In the specimen under consideration instead of the J-shaped free-oviduct, and the gradually tapering sperm duct, the former was thrown into a series of saccular dilatations and nearly twice as long as usual, while the sperm duct was a fine wavy tube of almost equal dimensions throughout.

I have elsewhere ⁽¹⁾ described and figured the variations met with in the generative organs of this species, in some hundreds of specimens dissected during 1892—1895, and these were exceedingly few. This is the first I have met with since, and quite distinct from any previously described.

7.—Absence of the Male Generative Organs in *Arion hortensis*, Fer.

It may be of interest to record that recently when opening a specimen of this mollusc collected in the south of England, I was somewhat surprised to find the whole of the male portion of the generative organs absent. As in other cases recorded for different species of this genus, the sperm duct, vas deferens, receptaculum seminis and duct, and the prostatic canal, were all wanting.

PROCEEDINGS OF THE MIDLAND MALACOLOGICAL SOCIETY.

47TH MEETING, NOVEMBER 13TH, 1903.

The President in the chair.

EXHIBITS.

By Mr. Gay Breeden : Series of shells of different species of *Limnæa* from various localities.

By Mr. Collinge : A drawer from the Hunter-Barron Collection containing British species of *Limnæa*.

48TH (ANNUAL) MEETING, DECEMBER 11TH, 1903.

The President in the chair.

The Annual Report of the Council and the Treasurer's statement were read and adopted.

In the absence of any amendments to the Council's nominations, the following

Council and officers were delared elected for 1904.

President—Walter E. Collinge, M.Sc.

Vice-President—E. R. Sykes, B.A., F.L.S.

Treasurer—H. H. Bloomer.

Secretary—H. Overton.

Librarian and Curator—Guy Breeden.

Council—Guy Breeden, H. Willoughby Ellis, F.E.S., H. McClelland, and Bromley Peebles.

EXHIBITS.

By Mr. McClelland : A small collection of South African marine shells.

49TH MEETING, JANUARY 15TH, 1904.

The President in the chair, who delivered his Presidential Address, entitled "Some neglected branches of Malacology."

50TH MEETING, MARCH 11TH, 1904.

The President in the chair.

The Secretary announced and laid upon the table a number of additions to the Library.

EXHIBITS.

On behalf of Mr. McClelland : A very small, but full grown specimen of *Helix nemoralis*.

By Messrs. Collinge, Breeden and Overton : Collections of the British species of *Pisidium* from various localities.

CURRENT LITERATURE.

Pilsbry, Henry A.—Manual of Conchology, ser. ii, vol. xvi (pt. 62) pp. 65—128, pls. 19-31, (pt. 63). pp. 129—192, pls. 1—15, (pt. 64), pp. 193—329, (pt. 64a), pp. i—xl, pls. 16—37. Philadelphia : Academy of Natural Sciences.

Continuing the genus *Brachypodella*, the author describes the Jamaican species, the sub-genera *Simpliocerix*, Pilsbry, *Mychostoma*, Albers, with *B. diminuta*, n. sp., *B. alba* (C. B. Ad.), vars. *cos*, *minima*, *striata*, and *occidentalis*, nov., and *Apoma*, Beck.

Turning next to the genus *Pinceria*, Poey (Type *P. beathiana*, Poey), the four known species are reviewed.

The genus *Macroceramus*, Guilding, which follows next, stands apart from all other genera of *Urocoptinae*. Anatomically it has not yet been described. The genus is represented in Haiti by three groups of species : the groups of *M. tenuiplicatus*, of *M. klatteanus*, and of *M. lineatus*. In the latter group *M. signatus* var. *salleanus*, *M. richaudi*, vars. *lineatistrigatus* and *sublineatus* are new, as also *M. gabbi* from Santo Domingo. In the group of *M. tenuiplicatus* the var. *swiftianus* of that species is new, and in the *M. klatteanus* group *M. sub-cylindricus* is a new species. The East and Central Cuban species follow.

The next genus *Microceramus*, Pils. and Van., is also undescribed anatomically. The following are described as new : *M. gossei* (Pfr.), var. *providentia*, and *M. swiftianus* (Orb.), var. *perconicus*.

The *Megaspiridae*, Pils., are next commenced. The author remarks that the members of this family seem to have been differentiated from their allies, the *Clausiliidae*, in the Northern Hemisphere of the Old World, during Mesozoic time. *Eomegaspira* represents a branch which attained high specialisation at the dawn of the Eocene in Western Europe, and shortly thereafter became extinct, either in consequence of over-specialisation, or as a result of physical changes in the unstable geography of this area. The ancestors of *Perrieria* and *Coclocion* made their way south-eastward to Papua and Australia, while the Brazilian *Megaspira* traces its forebears over the mid-Atlantic, like the *Streptaxidae*, *Ampullariidae*, of the same region, from tropical Africa, whence they migrated to South America over the Cretaceous land-bridge supposed to have spanned the Atlantic.

The following genera are reviewed, *Callionepion*, Pils. and Van., *Megaspira*, "Lea," Jay, *Eomegaspira*, Pils., and *Perrieria*, Tap. Can.

An Index to the *Urocoptidae* and *Megaspiridae* follow, and the author then passes on to the *Achalinidae*.

In this last mentioned family the following genera are treated of: *Pseudachatina*, Albers, with *P. pyramidata*, Kob. v. *kobeltiana*, n. var., *P. daillyana*, n.sp., from West Africa; *Atopocochlis*, Cr. & Fisch.; *Pseudotrochus*, H. & A. Ad., with *P. morelettianus* (Desh.) v. *pallidior*, n. var.; *Perideriopsis*, Putz.; *Limicolaria*, Schum., with *L. tryoniana*, *L. agathina*, *L. lucalana*, and *L. felina*, Shuttl. v. *zebra*, all new and from West Africa; *L. flammata* (Caill.) v. *smithi* and *L. longa*, both new from East Africa; *Burtoa*, Bourg., and *Melachalina*, Pils.

The supplementary part (64a) is an exceedingly interesting one, and is entirely devoted to the *Urocoptidae*.

Commencing with a definition of the family, the author passes at once to the general morphology. The general structure of the pallial organs is rather that of the *Bulimulidae* than of the *Clausiliidae*. The generative organs have been examined in a few species of *Eucalodium*, *Coelocentrum*, *Berendtia*, *Anisospira*, *Epirobia*, *Holospira*, *Urocoptis*, and *Brachypodella*. In the first six genera they are characterised by a usually very short, thick penis, with a long epiphallus, the retractor muscle is inserted on the diaphragm, and the receptaculum seminis has a long duct arising not very high on the vagina. In the two remaining genera, the penis is longer, the epiphallus apparently obsolete, and the receptacular duct arises higher. The alimentary canal is long and varies considerably in the different genera, the pharynx or buccal mass, however, is always short, as in the *Helicidae*. The jaw and radula are subject to much variation. Respecting the free retractor muscles, in *Eucalodium* the pharyngeal and left retractors branch from the root of the columellar, and then the ocular, which is thus united for a short distance with the columellar. Anteriorly the two oculars unite to form a muscular plate over the pharynx. In *Coelocentrum* the left ocular and pharyngeal retractor are united for a third of their length, and the pharyngeal retractor gives off a band to each anteriorly. In *Holospira* the left ocular is united part way with the pharyngeal and the right with the columellar muscles. In *Urocoptis brevis* the muscles arise as in *Eucalodium*, but are independent distally, and the right ocular functions also as a penial retractor. Finally in *Brachypodella chemnitziana* the pharyngeal and ocular retractors are united for a third of their length, and the columellar runs free of them. From the morphological right retractor a group of fibres arise which pass to the vas deferens and vagina.

The form, colouration, sculpture, and axis of the shell are next dealt with, followed by a consideration of the significant characters and evolution of the family. It is pointed out that many genera are in the stage termed phylogerontic by Hyatt. They are in the old age of the race, and Dr. Pilsbry believes that many phyla will not outlast the present geological period. Evidences of decadence are seen in the specialisation of the radula, the decreasing growth-power indicated by the fusiform shape of

the shell, and the laxity of coil, while the structure of the axis indicates that many phyla have passed their acme of specialisation, and are on the decline.

Parallel and convergent evolution is well illustrated by certain shell characters, and comparisons are instituted between the shells of the different genera. The geological and zoogeographical data bearing on the family are next reviewed, together with historical notes on the classification and that adopted in the present work. Finally an analytical key to genera completes this valuable and interesting work.

We have long wished to see the biological side of each family dealt with, and it is by no means an easy task the author has had to deal with. The work has been well done, as one would expect from an expert of such great ability, indeed no higher praise can be given to volume xvi than to say it is worthy of the reputation of its author.

In conclusion we must regret, with all malacologists who appreciate this magnificent monograph, the exceedingly careless manner in which the different parts of this volume are stitched. There is no reasonable excuse for stitching nearly three-eighths of an inch into the pages and plates of any work.

Hedley, Charles.—Scientific Results of the Trawling Expedition of H.M.C.S. "Thetis." Mollusca, Part II. Mem. Aus. Mus., 1903, vol. iv, pt. 6, pp. 327–402, pls. xxxvi–xxxviii, and 53 figs. in text.

The second part of Mr. Hedley's paper treats of the Scaphopoda and Gastropoda, and records 4 species of the former, of which 2 are new, and 161 of the latter, 35 of which are new.

Epigrus (Type *Rissoa ischnus*, Tate) is a new genus allied to *Scrobs*, Watson, and *Myxa* (*M. exesa*, n. sp.) is a new genus of the *Pyramellidae*, umbilicate, with few whorls, no columella fold, and the lip produced anteriorly. A new genus of the *Buccinidae* related to *Hindsia* is described under the name of *Fascinus* (Type *F. typicus*, n. sp.). In several points it recalls *Colubraria*, but lacks the varices on the upper whorls, in other *Nassa*, but the pattern of the sculpture is foreign to that genus, while the large apex and absence of columella plications separate it from *Hindsia*.

We note with some disappointment, the absence of anatomical details for any of the new genera or species.

Melvill, J. Cosmo and Ponsonby, J. H.—Descriptions of Thirty-one Terrestrial and Fluvial Mollusca from South Africa. Ann. Mag. Nat. Hist., 1903 (s. 7.), vol. xii, pp. 595–609, pls. xxxi, xxxii.

This the seventeenth contribution towards the elucidation of the non-marine Molluscan fauna of South Africa, includes descriptions of eleven species of *Ennea*, eight of *Trachycystis*, two of *Ancylus*, and one each of ten other genera.

Trachycystis scolopendra is an interesting species, and perhaps the most remarkable South African Helicoid yet described. *Fauxulus crawfordianus* is a particularly fine and interesting dextral species, with six unusually complicated peristomatal processes. A very handsome species of *Tropidophora*, and a *Chondrocyclus* may also be mentioned.

Ellot, C.—On some Nudibranchs from East Africa and Zanzibar. Part II. Proc. Zool. Soc. Lond., 1903, pp. 250–257.

The author describes two new genera and five new species, none of which, however, are figured.

Ceratophyllidia africana, gen. et. sp. nov., is described from a single specimen, possessing a buccal apparatus similar to that of *Phyllidopsis*, with the back studded with papillae. *Pleurophyllidiella horatii*, gen. et sp. nov., is also described from a single specimen and appears to be intermediate between *Pleuroleura* and *Pleurophyllidia*. The remaining new species are—*Baeolidia major*, *Cerberilla africana*, and *Ercolania zanzibarica*,

Dall, W. H.—Contributions to the Tertiary Fauna of Florida. Pt. vi. Trans. Wagner Free Inst. Sci. Philad., 1903, vol. iii, pp. xiv, 1219—1654. pls. xlviii—lx.

We heartily congratulate Dr. Dall on the completion of his great work. The first part was issued in 1890, and further parts have been issued from time to time, the sixth completing this invaluable monograph. In all the work comprises upwards of seventeen hundred printed pages and sixty beautiful plates containing over eleven hundred figures.

In the present part the author continues his review of the *Teleodomesmacea*, following with the *Anomalodesmacea*, and describes many new species in both orders. The Brachiopoda are next treated of, and finally a most interesting and valuable "Discussion of the Geology" is given.

Dall, W. H. and Bartseh, P.—Synopsis of the Genera, Sub-genera and Sections of the family Pyramidellidae. Proc. Biol. Soc. Washington, 1904, vol. xvii, pp. 1—6.

The authors recognise four genera, viz., *Pyramidella*, Lam., *Turbonilla*, Risso, *Odostomia*, Flem., and *Murchisonella*, Mörch. The first genus is then divided into 24 sub-genera and sections of which the following are new: *Milda*, (Type *Obeliscus ventricosus*, Quoy), *Voluspa* (Type *Pyramidella auricoma*, Dall), *Callolongchaeus* (Type *P. jamaicensis*, Dall), *Ulfa* (Type *P. (Ulfa) cossmanni*, nom. nov. = *Syrnola striata*, Cossm.), *Tropaeas* (Type *P. subulata*, A. Ads.), *Vagna* (Type *P. paumotensis*, Tryon), *Cossmannica* (Type *P. clandestina*, Desh.), *Orinella*, nom. nov. (Type *Orina pinguiscula*, A. Ads.), *Sulcorinella* (Type *P. (S.) dodona*, n. sp.), *Iphiana* (Type *Syrnola densistriata*, Garrett), and *Syrnolina* (Type *Syrnola rubra*, Pse.).

The second genus is divided into 21 sub-genera and sections the following being new: *Saccolina*, nom. nov. (Type *Spica monterosatoi*, Sacco), *Visma* (Type *Eulimella tenuis*, Sby.), *Lancellata*, nom. nov. (Type *Turbonilla (Lancea) clongata*, Pse.), *Asmunda* (Type *Chemnitzia turrita*, C. B. Ad.) and *Baldra* (Type *Turbonilla (B.) archeri*, n.sp.).

The genus *Odostomia* contains 40 sub-genera, the following 10 being new: *Villia* (Type *O. (V.) pilsbryi*, n.sp.), *Folinella* (Type *Amoura anguliferens*, De Fol.), *Besla* (Type *Chrysallido convexa*, Cpr.), *Egila* (Type *C. lacunata*, Cpr.), *Haladra* (Type *C. photis*, Cpr.), *Izidia* (Type *Parthenia armata*, Cpr.), *Evalina* (Type *O. (E.) americana*, n.sp.), *Stomega* (Type *O. cinspicua*, Ald.) *Haida* (Type *Syrnola caloosensis*, Dall), and *Lysacme* (Type *Chrysallida clausiliformis*, Cpr.).

Kennard, A. S. and Woodward, B. B.—Holocene Deposits at Clifton Hampden, near Oxford. Proc. Cotteswold Nat. Field Club, 1903, vol. xiv, pp. 191—203.

The authors record 54 species of land and freshwater shells from three beds on the banks of the Thames at Clifton Hampden, of which 15 are land and 39 freshwater forms. As the authors remark it is not often that in these recent deposits any marked super-position of beds occurs, hence the importance of the present section, in which Bed A. yielded 30, Bed B. 49, and Bed C. 26 species.

Knight, G. A. F.—A Visit to the Outer Hebrides in search of Mollusca. Trans. Perthshire Soc. Nat. Sci. 1903, vol. iii, pp. 193—217.

Mr. Knight gave an interesting account of a holiday spent in the Outer Hebrides in search of Mollusca. He records 71 species and 9 varieties of marine molluscs, 8 species and 1 variety of land, and 1 species and variety of freshwater.

Collinge, Walter E.—Report on the Non-operculate Land Mollusca. Fasciculi Malayenses, Zoology, 1904, vol. i, pp. 205—218, pl. xi—xiii.

The author describes the collection made by Messrs. Annandale and Robinson during 1901—2 in the Malay Peninsula.

A new species of *Damayantia* is described and one of *Parmarion*, also one of the genus *Atopos*.

After examining the anatomy of the *Helicarion lowi* of de Morgan, Mr. Collinge is of opinion that it can not be retained in that genus. It is closely related to certain species of *Ariophanta*, and he suggests that it should be placed in the genus *Nitigiria*.

The variety *martensi* of *Hemiplecta salangana* is also new, as well as the variety *globosus*, Fulton, of *Amphidromus ferakensis*, Full.

McIntosh, Prof.—The Story of a Pearl. Zool., 1904 (s. 4), vol. viii, pp. 41—56, pl. 1.

Professor McIntosh gives interesting account of the views of the earlier writers on pearl formation, as well as those of recent times.

Lebour, Marie V.—Additions to the List of Marine Mollusca of Northumberland. Report Northumberland Sea Fish. Comm., 1903, p. 50.

The authoress adds to her previous lists, *Limapontia nigra*, Johnst., *Goniadoris nodosa*, (Mont.), *Doris bilamellata*, L., and *Trochus helicius*, Fabr.

Thiele, Joh.—Anatomisch-systematische Untersuchungen einiger Gastropoden. Wiss. Ergeb. deutschen Tiefsee-Exped. a. d. Dampfer "Valdivia" 1898—1899, 1903, Bd. vii, pp. 149—174, Tfn. vi—ix.

Bavay, A. and Dautzenberg, Ph.—Description de coquilles nouvelles de l'Indo-Chine. Journ. de Conchyl. 1903, vol. li, pp. 201—236, pls. vii—xi.

The authors in this their third contribution to the mollusca of the Indo-China region, describe and figure numerous new species and varieties, amongst those we may number as especially interesting: *Streptaxis (Odontartemon) mabillei*, *Sitala acutecarinata*, *Boysidia messageri* and *gereti*, and *Helicomorpha scalaroides*. In addition to the new species, figures are also given of some hitherto unfigured.

EDITOR'S NOTES.

The Editor again appeals to those subscribers whose subscriptions are one, two or three years in arrear to kindly forward the same. Unless these subscriptions are paid during the present year, the question of the continued publication of the Journal will have to be seriously considered.

We note with much pleasure the election of our editorial colleague, Mr. E. R. Sykes, to the Presidency of the Malacological Society of London.

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ON A COLLECTION OF MARINE SHELLS FROM
PORT ALFRED, CAPE COLONY.

By EDGAR A. SMITH, I.S.O.,

British Museum (Natural History) London.

(Plates ii, iii.)

IN the early part of last year the British Museum received from Lieut.-Col. W. H. Turton, R.E., a large series of shells collected by him at Port Alfred, Cape Colony. The collection is of interest, as it contains a considerable number of new forms and also a few others which are new to the known fauna of South Africa. It also shows how rich in species this particular locality evidently is. It has been thought useful and interesting to give a list of the species as all were obtained at one place and within the short period of two or three months. Besides the species enumerated, there are numerous specimens which, being beach-rolled, (the whole collection having been obtained on the shore), are beyond recognition. Others are too young to be dealt with and a few belong to families, *Vermetidae*, *Ostracidae*, etc., which are extremely difficult to determine. Probably altogether about fifty species are comprised in this unnamed material which are not included in the following list, and Colonel Turton writes that he has upon a second visit to Port Alfred found a considerable number of species which were not in his first collection. It is not therefore improbable that some four hundred and fifty species will eventually be recorded from this one locality.

All the species about to be enumerated, excepting those new to the fauna,⁽¹⁾ are quoted and references given, either in Sowerby's "Marine Shells of South Africa," or in my paper in the Proc. Malacol. Soc., vol. v, pp. 354—402.

1. Marked in the list with an asterisk.

JOURNAL OF MALAC., 1904, vol. xi, No. 2.

A. LIST OF SPECIES.

- Spirula peroni*, Lamk.
Melampus acinoides, Morelet.
Gadinia costata, Krauss.
 **Ampullarina africana*, n.sp.
Siphonaria concinna, Sowb.
Siphonaria capensis, Q. & G. var.
Siphonaria aspera, Krauss.
Bulla ampulla, Linn.
Hydatina physis, Linn.
Haminea natalensis, Krauss.
Cylindrina cylindracea, Pennant.
Tornatina voluta, Q. & G.
Actaeon albus, Sowb.
Retusa truncatula, Brug.
Terebra capensis, Smith.
 **Terebra suspensa*, n.sp.
Conus infrenatus, Reeve.
Conus pictus, Reeve.
Conus bairstowi, Sowb.
Conus tinianus, Hwass.
Clionella kraussi, Smith.
Clionella bipartita, Smith.
Clionella subventricosa, Smith.
Clionella rosaria, Reeve.
Clionella sinuata, Born. var.
Clionella (?) *platystoma*, Smith.
Clavatula gravis, Hinds.
Pleurotoma fultoni, Sowb.
Drillia rousi, Sowb.
Drillia caffra, Smith.
Drillia layardi, Sowb.
Drillia diversa, Smith.
Drillia bairstowi, Sowb.
Drillia hottentota, Smith.
 **Drillia albonodulosa*, n.sp.
 **Drillia thetis*, n.sp.
 **Drillia nivosa*, n.sp.
 **Drillia subcontracta*, n.sp.
 **Drillia praetermissa*, n.sp.
Clathurella capensis, Smith.
Clathurella ponsonbyi, Sowb.
Clathurella grayi, Reeve.
 **Clathurella crassilirata*, n.sp.
Clathurella verrucosa, Sowb.
Mangilia septangularis, Mont.
Mangilia amplexa, Gld.
 **Mangilia alfredi*, n.sp.
Daphnella (?) *sulcata*, Sowb.
Daphnella capensis, Sowb.
 (= *Columbella capensis*.)
 **Glyphostoma siren*, n.sp.
Mitromorpha volva, Sowb.
Alcira elegans, H. Ad.
Columbella lightfooti, Smith.
Columbella pyramidalis, Sowb.
Columbella algoensis, Sowb.
Columbella albuginosa, Rve.
Columbella cerealis, Menke.
 **Columbella adjacens*, n.sp.
Cancellaria semidisjuncta, Sowb.
Cancellaria foveolata, Sowb.
Ancilla obtusa, Swainson.
 **Ancilla reevei*, n.sp.
Ancilla obesa, Sowb.
Ancilla fasciata, Rve.
Ancilla albozonata, n.sp.
 (= *A. cinnamomea*, Sowb. non Lank.)
Ancilla marmorata, Rve.
Marginella ornata, Redfield.
Marginella mosaica, Sowb.
Marginella piperita, Hinds.
Marginella bairstowi, Sowb.
Marginella albocincta, Sowb.
Marginella punctilineata, Smith, var.
Marginella neglecta, Sowb.
Marginella zonata, Kiener.
Marginella keenii, Marratt.
 **Marginella pura*, n.sp.
Marginella pellicula, Marratt ?
Marginella burnupi, Sowb.
 **Marginella differens*, n.sp.
Marginella cylindrica, Sowb.
Marginella algoensis, Smith.
Marginella fallax, Smith.

- **Marginella corusca*, Reeve.
 **Marginella dulcis*, n.sp.
 **Marginella munda*, n.sp.
 **Marginella pseutes*, n.sp.
Voluta africana, Rve.
Mitra picta, Rve.
Mitra latruncularia, Rve.
Mitra patula, Rve.
Mitra merula, Sowb.
Mitra capensis, Dkr.
Mitra canaliculata, Sowb.
Mitra euzonata, Sowb.
Mitra bathyraphe, Sowb.
Mitra kowiensis, Sowb.
Fasciolaria heyneimanni, Dkr.
Latirus rousi, Sowb.
Latirus bairstowi, Sowb.
Fusus ocelliferus, Bory, var. *robustior*, Sowb.
 **Fusus cingulatus*, n.sp.
Melapium lineatum, Lamk.
Cominella lagenaria, Lamk.
Cominella tigrina, Kiener.
Cominella porcata, Gmelin.
Cominella elongata, Dkr.
Cominella unifasciata, Sowb.
Cominella puncturata, Sowb.
Cominella capensis, Dkr.
Cominella angusta, Sowb.
Tritonidea insculpta, Sowb.
Euthria fuscotincta, Sowb.
Sylvanocochlea ancilla, Hanley.
Eburna papillaris, Sowb.
Nassa crawfordi, Sowb.
Nassa pulchella, A. Ad.
Nassa poecilosticta, n.sp.
 (= *N. coccinea* (A. Ad.), Sowb.)
Nassa pyramidalis, A. Ad.
Nassa speciosa, A. Ad.
Nassa serotina, A. Ad. var.
Nassa kraussiana, Dkr.
Nassa (*Demoulia*) *abbreviata*, Gmel.
Nassa retusa, Lamk.
Bullia callosa, Wood.
- **Bullia trifasciata*, n.sp.
Bullia laevis, Gmel.
Bullia tenuis, Rve.
Bullia annulata, Lamk.
Bullia rhodostoma, Gray.
Bullia semiusta, Rve.
Bullia diluta, Krauss.
Bullia pura, Melvill.
Murex uncinarius, Lamk.
Murex scrobiculatus, Dkr.
Murex babbingtoni, Sowb.
Murex kieneri, Rve.
Murex crawfordi, Sowb.
Trophon insignis, Sowb.
Purpura capensis, Petit.
 **Purpura texturata*, n.sp.
Purpura squamosa, Lamk.
Purpura cataracta, Chemn.
Purpura castanea, Küster.
 (Syn. *Cominella unifasciata*, Sowb.)
Latiaxis rosaceus, Smith.
Coralliophila rubrococcinea, Melv. & Standen.
Lotorium sauliae, Rve.
Lotorium africanum, A. Ad.
Lotorium leucostoma, Lamk. var.
Lotorium doliarium, Lamk.
Lotorium klenei, Sowb.
Lotorium olearium, Desh.
Lotorium argus, Lamk.
Ranella granifera, Lamk.
Ranella anceps, Lamk.
Cassis achatina, Lamk.
Dolium dunkeri, Hanley.
Radius aurantia, Sowb. ?
Cypraea citrina, Gray. var.
Cypraea edentula, Sowb.
Cypraea minoridens, Melvill.
Cypraeovula capensis, Gray.
Trivia oniscus, Lamk.
Trivia vesicularis, Gaskoin.
Trivia formosa, Gaskoin.
Trivia oryza, Lamk.
Cerithium pingue, A. Ad.

- **Cerithiopsis trilineata*, Phil.
Cerithiopsis exquisita, Sowb.
Cerithiopsis foveolata, Sowb.
Trifora perversa, Linn.
 **Trifora convexa*, n.sp.
 **Trifora fuscomaculata*, n.sp.
Trifora cingulata, A. Ad.
 **Trifora fuscescens*, n.sp.
Turritella carinifera, Lamk.
Littorina knysnaensis, Phil.
Littorina africana, Phil.
Diala dubia, Sowb.
Diala pinnae, Krauss, var?
Assiminea bifasciata, Nevill.
Assiminea umlaasiana, Smith.
 **Rissoina alfredi*, n.sp.
Rissoina elegantula, Angas.
Rissoa fenestrata, Krauss.
 **Rissoa perspecta*, n.sp.
Rissoa argentea, Sowb.
 **Rissoa conspecta*, n.sp.
Rissoa (Cingula) caffra, Sowb.
Torinia dorsuosa, Hinds.
Torinia variegata, Gmelin.
Crepidula (Crypta) aculeata, Gmelin.
Crepidula (Crypta) adspersa, Dkr.
Crepidula (Trochita) helicoidea, Sowb.
Crepidula (Mitrella) chinensis, Linn.
Natica imperforata, Gray.
Natica forata, Rve.
 **Natica decipiens*, n.sp.
 **Natica napus*, n.sp.
Natica didyma, Bolten.
Ianthina globosa, Swains.
Ianthina communis, Lamk.
Ianthina exigua, Lamk.
Scala aculeata, Sowb. var.
Scala coronata, Lamk.
Scala fragilis, Hanley?
Scala lactea, Krauss.
 **Acrilla gracilis*, H. Ad.
Syrnola capensis, Sowb.
 **Mormula rissoina*, A. Ad.
 **Turbonilla hofmani*, Angas.
Turbonilla tineta, Sowb.
Turbonilla laeviscostata, Sowb.
Turbonilla tegulata, Sowb.
 **Turbonilla gemmula*, n.sp.
Turbonilla bathyrapphe, Sowb.
 **Turbonilla decora*, n.sp.
Cingulina circinata, A. Ad.
Odostomia robusta, Sowb. var.
Odostomia lavertinae, Smith.
Odostomia (Ondina) lucida, Sowb.
Miralda crispa, Sowb.
Graphis pellucida, Sowb.
Eulima distorta, Desh.
 **Eulima distincta*, n.sp.
Eulima dilecta, Smith.
Eulima langleyi, Sowb.
Eulima simplex, Sowb.
 **Eulimella nivea*, n.sp.
 **Eulimella minor*, n.sp.
Niso balteata, Sowb.
 **Niso interrupta*, Sowb.
Astrarium taylorianum, Smith.
Turbo (Ocina) cidaris, var. *natalensis*.
Turbo (Samarticus) sarmaticus, Linn.
Leptothyra sanguinea, Linn.
 **Leptothyra armillata*, A. Ad.
Phasianella elongata, Krauss.
Phasianella kochi, Phil.
Phasianella bicarinata, Dkr.
Phasianella capensis, Dkr.
Clanculus miniatus, Anton.
Calliostoma bicingulatum, Lamk.
Gibbula tryoni, Pilsbry.
Gibbula multicolor, Krauss.
Gibbula benzi, Krauss.
Gibbula fucata, Gld.
Gibbula cicer, Menke.
Oxysteles impervia, Menke.
Oxysteles tabularis, Krauss.
Oxysteles tigrina, Chemn.
Oxysteles merula, Chemn.
 **Cynisca forticostata*, n.sp.
Cyclostrema planulata, Sowb.
 **Ethalia africana*, n.sp.

- Haliotis sanguinea*, Hanley.
Haliotis midae, Linn.
Pupillia aperta, Sowb.
Fissurellidæa hiantula, Lamk.
Fissurellidæa concatenata, Cr. & Fisch.
Fissurella natalensis, Krauss.
Glyphis elizabethæ, Smith
Glyphis calyculata, Sowb.
Glyphis spreta, Smith.
Glyphis elevata, Dkr.
Patella variabilis, Krauss.
Patella rustica, Linn. ?
Patella umbella, Gmelin.
Patella granularis, Linn.
Patella argenvillei, Krauss ?
Patella plicata, Born.
Patella longicosta, Lamk.
Patella oculus, Born.
Patella (Olana) cochlear, Gmelin.
Patella (Patina) pruinosa, Krauss.
Helcion pectinata, Linn.
Chiton tulipa, Q. & G.
Callochiton castaneus, Wood.
Dinoplax gigas, Gmelin.
Acanthochites garnoti, Blainville.
Dentalium belcheri, Sowb.
Lima rotundata, Sowb.
 **Lima perfecta*, n.sp.
Pecten tinctus, Reeve.
Margaritifera capensis, Sowb.
Mytilus (Chloromya) perna, Linn.
Mytilus (Aulacomya) variabilis, var ?
 **Modiola tenerrima*, n.sp.
Modiola petagnæ, Scacchi. var ?
Modiola lignea, Reeve.
Modiolaria coenobita, Vaillant.
Arca lactea, Linn.
Arca obliquata, Wood.
Glycimeris queketti, Sowb. jun. ?
 **Limopsis pumilio*, n.sp.
 **Hochstetteria velaini*, n.sp.
 **Hochstetteria limoides*, n.sp.
Thecalia concamerata, Brug.
Carditella rugosa, Sowb.
 **Carditella laticostata*, n.sp.
Neocardia angulata, Sowb.
Cardita elata, Sowb.
 **Cardita minima*, n.sp.
Crassatella acuminata, Sowb.
Cardium turtoni, Sowb.
Cardium natalense, Sowb.
Dosinia hepatica, Lamk.
Venus verrucosa, Linn.
Meretrix (Tivela) compressa, Sowb.
Meretrix (Chione) kochi, Phil.
Sunetta ovalis, Sowb.
Circe pectinata, Linn.
Tapes corrugatus, Gmelin
Venerupis robusta, Sowb. ?
Schizodesma spengleri, Gmelin.
Mactra ovalina, Lamk.
Standella solandri, Gray.
 (Syn. *Petricola Iyra*, Melvill).
Gastrana abilgaardiana, Spengler.
Tellina rosea, Spengler.
Tellina natalensis, Krauss.
Tellina ponsonbyi, Sowb.
Tellina triangularis, Chemn.
 **Tellina regularis*, n.sp.
Psammotellina capensis, Sowb.
Macoma littoralis, Krauss.
Macoma cumana, Costa, var. ?
Donax serra, Chemn.
Donax sordidus, Hanley.
 **Semele capensis*, n.sp.
 **Theora ovalis*, n.sp.
Solen capensis, Fischer.
Cultellus decipiens, n.sp.
 (= *pellucidus*, Sowb. non Pennant).
Loripes clausus, Philippi.
 (= *L. lacteus*, Sowb. non Linn).
Lucina despecta, n.sp.
 (= *L. columbella*, Sowb. non Lamk.)
 **Lucina valida*, n.sp.
Cryptodon globosus, Forsk.
Felania subradiata, Sowb.
 **Pholas fragilis*, Sowb.
Nucula nucleus, Linn.

- | | |
|--|---------------------------------------|
| * <i>Tellimya similis</i> , n.sp. | <i>Kellia rotunda</i> , Desh. |
| * <i>Montacuta macandrewi</i> , Fischer. | <i>Kellia mactroides</i> , Hanley. |
| <i>Lasaea australis</i> , Souverbie. | * <i>Lepton fortidentatus</i> , n.sp. |

B. DESCRIPTIONS OF NEW SPECIES AND REMARKS UPON A FEW
OTHER PREVIOUSLY DESCRIBED FORMS

***Drillia thetis*, n.sp.**

Pl. ii, fig. 1.

Testa parva. ovato-fusiformis, alba, rufescens, vel fuscescens; anfractus normales 5 convexi, costis obliquis leviter flexuosis (in anfr. penultimo 10—12) instructi, inter costas spiraliter tenuiter striati, sutura obliqua sejuncti, ultimus infra medium contractus, costis inferne evanidis, et pone labrum interdum plus minus obsoletis; apertura parva, irregulariter sub-ovata, longit. totius $\frac{2}{3}$ fere aequans; labrum tenue, arcuatim prominens, superne late sed haud profunde sinuatum; columella leviter arcuata, callo tenui induta.

Longit. 10 millim., diam. 4; apertura 4 millim. longa, 2 lata.

The rather convex whorls, the oblique and slightly flexuous ribs and the close fine spiral striae, are the principal features of this species. It seems to be variable in colour, some specimens being entirely white, others reddish or brownish. Some white examples have a brown zone below the suture and another round the middle of the body-whorl, and one pale specimen has some distant, obscure, reddish spots upon the upper part of the whorls. The spiral striae are most conspicuous between the costae.

***Drillia subcontracta*, n.sp.**

Pl. ii, fig. 2.

Testa elongata, fusca, ad apicem mamillata, anfractus 8, superiores duo laeves, convexi, caeteri supra concavi, infra convexi, costis obliquis circiter 12, supra attenuatis, instructi, inter costas spiraliter fortiter striati, ultimus infra medium contractus, et costis obsoletis circa basim sulcatus; apertura sub-ovalis, supra et infra contracta, longit. totius circiter $\frac{1}{2}$ aequans; labrum tenue, haud profunde sinuatum; columella oblique arcuata, callo tenui pallido induta.

Longit. 12 millim., diam. 4.5; apertura 4 millim. longa, 2 lata.

The body-whorl is well rounded at the middle and then contracted below. A spiral striation or groove at the periphery, which also winds up the spire just above the suture, is usually more strongly marked than the rest.

***Drillia albonodulosa*, n. sp.**

Pl. ii, fig. 3.

Testa parva, rufo-fusca, serie nodulorum alborum cincta, ovato-fusiformis ; anfractus sex, superiores rotundati, laeves, caeteri supra excavati, infra convexi, costis nodiformibus albis obliquis infra instructi, spiraliter striati, ultimus ad medium nodose costulatus, infra circa basim oblique et fortius striatus ; apertura parva ; labrum ad marginem tenue, extus incrassatum, supra valde sinuatum ; columella rectiuscula, callo tenui superne tuberculiforme induta.

Longit. 8.3 millim., diam. 4 ; apertura 3.3 millim. longa, 1.5 lata.

A solid little species, well characterised by its style of colouration.

***Drillia praetermissa*, n. sp.**

Pl. ii, fig. 4.

Testa breviter subfusiformis, fuscescens, pallide costulata, rufo-fusco maculata, lineis spiralibus albo et fusco articulatis subobscuris ornata ; anfractus 8—9, apicales ?, caeteri supra concave declives, infra convexiusculi, costis obliquis 12—15 in concavitate obsoletis instructi, spiraliter tenuiter striati, ultimus costis infra medium evanidis, circa basim fortius strictus ; apertura longit. totius $1\frac{1}{4}$ adaequans, intus fuscescens ; labrum arcuatim prominens, tenue, supra rotunde sinuatum ; columella fere recta, callo tenui supra tuberculiforme induta.

Longit. 18 millim., diam. 7.

Allied to *D. nivosa*, but differing in colour and in its spire being more produced.

***Drillia nivosa*, n. sp.**

Pl. ii, fig. 5.

Testa mediocriter elongata, pallide fuscescens, lineis numerosis spiralibus albo et fusco-puncticulatis ornata ; spira elongata, ad apicem mammillata ; anfractus 7, duo superiores rotundati, laeves, caeteri supra concavi, infra convexi, costis obliquis (in concavitate obsoletis) 12—14 instructi, et spiraliter leviter striati, ultimus infra medium costis evanidis, circa basim fortius striatus ; apertura longit. totius circiter $\frac{3}{4}$ adaequans ; labrum tenue, arcuatum, supra subprofunde sinuatum ; columella levissime curvata, callo tenui, superne tuberculiforme indutum.

Longit. 17 millim., diam. 6.5 ; apertura 6.5 longa, 3 lata.

Two or three of the dotted lines around the middle of the whorls are more clearly defined than the rest. The specific name has reference to the white specks which cover the surface.

***Clathurella crassilirata*, n. sp.**

Pl. ii, fig. 6.

Testa parva, fusiformis, albida, infra suturam et circa basim fuscotincta ; anfractus 7 ?, supra declives, infra liris duobus crassis spiralibus rotundatis

instructi, ultimus triliratus, infra concave contractus et oblique striatus; apertura longit. totius circiter $\frac{3}{4}$ aequans; labrum supra ad suturam profunde et rotunde sinuatum, antice rufotinctum; columella rectiuscula, vel leviter sinuosa, callo tenui induta.

Longit. 8 millim., diam. 3.5.

Well characterised by the strong rounded spiral lirae and the deep labral sinus.

Glyphostoma siren, n. sp.

Pl. ii, fig. 7.

Testa parva, oblonga, dilute fuscescens, circa medium anfract. ultimi albo zonata; spira gradata, ad apicem obtusa; anfractus 5, superiores $1\frac{1}{2}$ laeves, convexi, caeteri convexiusculi, costis longitudinalibus circiter 10 et liris spiralibus (in anfr. ultimo 3—4) cancellati, ultimus liris circiter 10 cinctus; apertura angusta, longit. totius $\frac{1}{2}$ haud aequans; labrum incrassatum, superne conspicue sinuatum, intus sex-denticulatum; columella rectiuscula, callo tenui induta, tuberculis 2—3 minutis in medio munita.

Longit. 5.5 millim., diam. 2.3; apertura 2.5 millim. longa, 1 lata.

A rather strongly cancellated species, of a pale brownish colour with a zone round the middle of the body-whorl, which is also partly visible above the suture of the spire.

Daphnella (?) sulcata (Sowerby).

Cominella (?) sulcata, Sowerby: Marine Shells S. Afr., p. 11, pl. i, fig. 10, bad!

Hab.—Port Elizabeth (Sowb.).

The type of this species is in poor condition, so that certain features appear to have been overlooked in the original description. Of the six whorls the two apical ones are smooth, rounded, conspicuously large and mamilliform; the rest are rather convex and spirally grooved and ridged. They also exhibit lines of growth in the sulci, producing a sub-cancellated appearance, and the spirals are also faintly sub-granose. The labrum is a little thickened, ascends slightly upon the whorl above, and has a few minute tubercles upon the thickening within. The spiral lirae are about seven in number on the penultimate whorl and eighteen to twenty upon the last.

This species does not fall conveniently into any known genus, and although placed provisionally in the genus *Cominella* by Mr. Sowerby, it might with equal propriety be located in *Tritonidea*. In size and some other respects it recalls the general facies of some forms of *Daphnella*.

Most examples are uniformly light corneous and generally have a row of brown spots at the middle of the body-whorl, which is also continued up the spire.

Mangilia alfredi, n. sp.

Pl. ii, fig. 8.

Mangilia costata, Sowerby (nec Donovan) : Marine Shells. S. Afr. p. 7.*Hab.*—Algoa Bay (Sowb.).

This South African species differs from *M. costata* in form, the aperture being shorter and broader, also in the six or seven ribs being more regularly continuous up the spire, and especially in the much stronger spiral striation. The striae are close-set, hair-like, continued on and between the costae, and are easily observable under a simple lens. The colour is somewhat variable. Some specimens are white with a broad band round the middle of the body-whorl. Others are light brownish, and with or without a darker peripheral zone.

Ancilla albozonata, n. sp.

Pl. ii, fig. 9.

Testa oblonga, supra acuminata, fusca, ad apicem alba, infra suturam et infra medium anfractus ultimi et circa basim albozonata; spira convexe acuminata, callo tenui induta; apertura elongata, longit. totius circiter $\frac{7}{8}$ aequans, intus fusca, antice infra columellam alba; labrum tenue, parum arcuatum, supra ad insertionem album, antice ad extremitatem zonae externae albo tinctum; columella antice quasi reflexa, oblique sulcata, fuscescens.

Longit. 20 millim., diam., 10; apertura 14 longa, 4.5 lata.

The coloration of this species is characteristic and constant. The top of the spire is white, a white band falls round the upper part or shoulder of the body-whorl, a narrower white zone accompanies the upper of the two oblique grooves across the lower part of the whorl, the base of which is also white. The surface is smooth, exhibiting only faint lines of growth.

Smaller than *A. cinnamomea*, Lamk., from the Red Sea, and differently coloured. It is the *cinnamomea* of Sowerby's "Marine Shells of S. Africa," p. 16.

Ancilla reevel, n. sp.

Pl. ii, fig. 10.

Testa elongato-ovata, pallide carnicolor, infra suturam pallidior, laevis; spira plus minus callo pallido induta; anfractus 5?, ultimus magnus, elongatus, convexusculus, antice oblique bisulcatus, cingulo inter sulcos fusco maculato; labrum pallidum, parum arcuatum; columella antice incrassata, quasi reflexa, oblique sulcata, alba, vel dilute rosea.

Longit. 22 millim., diam. 10; apertura 12.5 millim. longa, 4.5 lata.

The colour is a pale fleshy tint, with a whitish or brownish zone beneath the suture, sometimes with a series of brown spots or dots upon the lower edge of it. The oblique girdle upon the front part of the body-whorl is also generally spotted with red. The reflexed columella is margined on the left side with an excavation or groove.

Fusus cingulatus, n. sp.

Pl. ii, fig. 11.

Testa breviter fusiformis, rimata, aurantia, ad angulum anfractuum albo cincta; anfractus 6, duo superiores globosi, laeves, caeteri supra oblique declives, in medio angulati et serie nodulorum instructi, tenuiter spiraliter lirati; ultimus lira conspicua paulo infra medium cinctus, antice in rostrum brevem productus; apertura supra irregulariter ovata, antice in canalem obliquum brevem producta; labrum simplex, tenue; columella arcuata, laevis, callo tenui albo induta.

Longit. 28 millim., diam. 14; apertura cum canali 14 millim. longa, 5.5 lata.

Recognisable by its style of colouration and the infraperipheral conspicuous lira. The nodules at the angle of the whorls gradually increase in size with the growth of the shell. There are about nine on the body-whorl.

Terebra suspensa, n. sp.

Pl. ii, fig. 12.

Terebra pertusa, Sowerby (nec Born): Marine Shells S. Afr., p. 24.

Testa parva, elongata, alba, pallide fusco maculata, ad apicem fuscens; anfractus 12, duo superiores (protoconcha) laeves, dilute fusci, rotundati, mammaeformes, caeteri lente accrescentes, leviter convexi, paulo infra suturam subconstricti, costis longitudinalibus numerosis tenuibus arcuatis instructi, inter costas spiraliter punctati, ultimus ad peripheriam rotundatus, circa basim zona fusca cinctus; apertura parva; columella alba, brevis, rectiuscula, antice obliqua; canalis brevissimus, obliquus.

Longit. 20 millim., diam. 4.5; apertura 4 millim. longa, 2 lata.

Hab.—Port Elizabeth (Sowb.).

This species differs from *T. pertusa* of Born in its much smaller size, finer and more numerous spiral series of punctures, rather shorter whorls, and in colour. The dark infrasutural band, so characteristic of *T. pertusa*, is wanting in the present species. The upper part of the whorls in Born's species is smooth between the riblets and is marked off by a conspicuous row of punctures, whereas in *T. suspensa* it is punctate between the costae, and less clearly defined.

Columbella (?) pyramidalis, Sowerby.

Columbella (Mitrella) pyramidalis, Journ. Conchol., Vol. vii, p. 370; Marine Shells S. Afr. Append., p. 10, pl. vi, fig. 4.

Hab.—Port Elizabeth (Sowb.).

Variable in colouration, sometimes being white, streaked with brown at intervals, and generally with an interrupted narrow opaque white line at the periphery, sometimes bordered above with a brown line which ascends the spire above the sutural line. Some specimens are pale brown, streaked or mottled with white, and dotted with brown at the pale periphery and upon the slight infrasutural margination. The lower part of the body-whorl in some of these specimens is whitish. The species has a *Terebra*-like appearance.

Mitromorpha volva, Sowerby, var.

Pl. ii, fig. 13.

Testa ovato-fusiformis, supra pallide fuscescens, infra albida, circa medium anfract. ultimi fusco notata vel zonata; spira conica, ad apicem mamillata; anfractus 6, superiores duo laeves, rotundati, caeteri spiraliter lirati (liris in anfr. penult. 4, infimo caeteris majori, albo, fusco picto, in ultimo circiter 15), in interstitiis longitudinaliter tenuiter striati; apertura angusta, longit. totius $\frac{1}{2}$ vix aequans; labrum tenue, vix incrassatum et supra inconspicue sinuatum; columella rectiuscula, laevis, in medio obsolete incisa.

Longit. 7.3 millim., diam. 3; apertura 3.5 millim. longa, 1 lata

At once recognised by its spiral sculpture and fusiformly ovate form. The whitish lira spotted with brown round the middle of the body-whorl, passes up the spire above the suture and is rather thicker than the rest. The specimens differ somewhat in colour, being of a rich brown tint, excepting the upper part of the whorls which is white with a few brown spots.

This variety differs from the type in colour and the stronger lirae. The typical form is uniformly very light brown, although described as white. It usually has five lirae on the penultimate whorl, whereas there are only four in the present variety.

Marginella punctilineata, Smith.

Two specimens differing somewhat from the type in colour. They are dirty whitish with slender brown lines, which are indistinctly dotted as in the normal form. The lower part of the columella is more or less stained with olive brown.

Marginella munda, n. sp.

Pl. ii, fig. 14.

Testa parva, fusiformis, alba, lineis angustis rosaceis subundulatis picta; anfractus 4–5 leviter convexi, sutura obliqua sejuncti; labrum mediocriter incrassatum, album, ad extremitatem posticam roseo maculatum; columella infra callo albo reflexo induta, quadriplicata.

Longit. 7 millim., diam. 3.3.

A small species characterised by its fusiform shape and style of colouration.

Marginella pura, n. sp.

Pl. ii, fig. 18.

Testa *M. metcalfei* similis, sed duplo major, antice minus contracta.

Longit. 6 millim., diam. 3.75.

This species quoted by Mr. Sowerby (Marine Shells S. Africa, p. 20) as the *M. metcalfei* of Angas, differs in size and shape. The Port Jackson shell is only 4 millim. in length, 2.5 in diameter, and is more contracted anteriorly. It is also not so pure white as the present species. Both have four columellar plaits. I cannot separate *M. metcalfei* and *M. ochracea*, both of Angas, and both from New South Wales.

***Marginella differens*, n. sp.**

Pl. ii, fig. 19.

Testa parva, ovata, alba, nitida; spira brevis, ad apicem obtusa; anfractus $3\frac{1}{2}$ celeriter accrescentes; labrum incrassatum, intus denticulatum; columella callo induta, quadriplicata.

Longit. 5 millim., diam. 3.25.

This species was quoted by Mr. Sowerby (*Marine Shells S. Africa*, p. 20) under the name of *M. bulbosa*, Reeve. It is shorter than that species, has coarser denticulation within the labrum, the columella callus is more defined, and the second plication from the base is more produced to the left over the whorl. The plicae are usually four in number, but an indication of a fifth is sometimes observable. The denticles on the labrum are in the form of short lirae which are visible exteriorly through the transparency of the shell.

***Marginella duleis*, n. sp.**

Pl. ii, fig. 20.

Testa parva, alba, polita, subpellucida; spira brevissima, alba, obtusa; anfractus 4; apertura angusta; labrum mediocriter incrassatum, intus laeve vel liris minutis brevibus 16—17 denticulatum; columella quinque vel sexplicata, plicis duobus anticis aliis majoribus.

Longit. 3.5 millim., diam. 2.2.

A very small subpellucid shell with the labrum smooth or minutely denticulate or lirate within; with a slight notch at the base or anterior end of the aperture, and six columellar folds, of which the two anterior are larger than the rest, which look more like minute denticles than plicae, and in adult specimens may be more or less obscured by callus.

***Marginella pseustes*, n. sp.**

Pl. ii, fig. 21.

Testa minuta, ovata, alba, pellucida, nitida; spira rotundata, haud exserta; anfractus 3, ultimus fere totam testam formans; apertura angusta; labrum extus valde incrassatum, intus laeve, longit. totam testae aequans; columella triplicata, plica antica obliqua, maxima, inferne labro juncta.

Longit. 2 millim., diam. 1.3.

A very small species, ovate, with a rounded apex, a conspicuously thickened lip for so small a shell, and three folds at the anterior end of the columella, of which the basal one is the thickest and unites with the labrum in front.

***Purpura texturata*, n. sp.**

Pl. ii, fig. 15.

Testa parva, ovato-turrita, pallide rufescens, supra porcas spirales rufo punctata; anfractus 6, superiores duo laeves, convexi, mamillaeformes, caeteri supra concavi, in medio nodose angulati, liris minutis spiralibus, incrementique lineis undique cancellati, ultimus porcis quaternis transversis instructus; apertura pallida, rufo fasciata, longit. totius $\frac{1}{2}$ paulo superans; columella alba, parum arcuata, callo tenui induta.

Longit. 22 millim., diam. 13 ; apertura 12 millim. longa, 6 lata.

Remarkable on account of the finely cancellated surface, the nodose angle of the whorls and the style of colouration. The ground colour is very light red, varied with dark brown or red dots or short lines upon the nodose angle of the whorls, and upon the three lower transverse ridges upon the body-whorl. Of these, that nearest the angle is also slightly nodose. The protoconch, consisting of about two whorls, is large, smooth and yellowish. The labrum is thin and very finely crenulated within the margin.

Quite distinct from *P. capensis*, Petit. The fine cancellation is quite different from the sculpture of that species.

***Purpura castanea*, Küster.**

Purpura castanea, Krauss MSS., Küster : Conch. Cab., p. 170, pl. xxviii, figs. 8, 9.

Cominella unifasciata, Sowerby : Journ. Conchol., vol. v, p. 3 ; Marine Shells S. Africa, p. 11, pl. i, fig. 11 ; Appendix, p. 4, var. *concolor*.

Hab.—Cape Agulhas (Küster) ; Port Elizabeth and Natal (Sowb.).

The variety *concolor* of Sowerby's *Cominella unifasciata* is the same as the typical form of *castanea*.

***Nassa poecilosticta*, n. sp.**

Pl. ii, fig. 16.

Testa acuminato-ovata, colore variabilis, aurantia vel fusca, sordide albida fusco lineata et punctata, circa medium anfractus ultimi linea interrupta fusca vel linea alba saepe picta ; anfractus circiter 8 convexusculi, costis leviter obliquis 12—16 lirisque spiralibus numerosis supra et inter costas continuis instructi, ultimus infra medium liris paucis crassioribus cinctus ; apertura parva ; labrum mediocriter incrassatum, intus liris brevibus 10—11 munitum, saepe pallidum, interdum in medio macula fusca pictum ; canalis anticus saepe fusco tinctus ; columella arcuata, callo tenui tuberculis 3—4 gerente amicta.

Longit. 14 millim., diam. 7 ; apertura intus 4.5 millim. longa, 3 lata.

This species is I believe the *N. coccinea* of A. Adams MSS. as understood by Mr. Sowerby (Marine Shells S. Africa, p. 12). As, however, I have never seen a scarlet specimen, and its colouration is so variable, I venture to propose the name *poecilosticta* for this apparently quite common shell. The manuscript name *coccinea* may therefore be disregarded in future. Mr. Sowerby in the Appendix to the above work (p. 5), has suggested that this species is the same as *N. coccinella*, Lamarck. This, however can scarcely be correct, as that species by general consent is regarded as synonymous with the common *N. incrassata* of British and European coasts.

Some specimens of the present species are uniformly orange, excepting the lip which is white within. Sometimes this variety has a white line round

the middle. Other specimens are uniformly rich brown. Some are dirty whitish, transversely lineated and dotted with brown, often with a more conspicuous interrupted line at the periphery which also passes up the spire above the suture. One specimen has the upper part of the shell pale, dotted with brown, and the lower half of the body-whorl bright orange. The costae are much more oblique in some examples than in others. In *N. fuscolineata*, Smith, from Japan, a closely allied species, the ribs slope in the opposite direction.

***Bulla trifasciata*, n. sp.**

Pl. ii, fig. 17.

Testa oblonga, subturrita, alba, fusco fasciata; anfractus 7, vix convexi, sutura alba callosa obliqua discreti, spiraliter sulcati, sulcis in anfr. penultimo circiter 7, anfr. ultimus infra suturam leviter turgidus, deinde contractus, transversim sulcatus; apertura irregulariter ovata, supra acuminata, intus fuscescens, subfasciata; labrum tenue, arcuatum; columella callo albo crasso reflexo induta.

Longit. 39 millim., diam. 18.

Allied to *B. annulata*, Lamarck, but differently coloured, with a narrower body-whorl, a less sharply turreted spire, and a broader columellar callosity. Of the three brown bands upon the body-whorl, the uppermost upon the swollen edge of the whorl is the darkest.

***Natica napus*, n. sp.**

Pl. ii, fig. 22.

Testa globosa, anguste umbilicata, alba, lineis incrementi tenuibus striisque spiralibus tenuissimis sculpta; spira brevis, obtusa, conoidea; anfractus 6 convexusculi, ultimus infra suturam zona opaca alba ornatus et prope aperturam leviter concave depressus; apertura alba; columella incrassata, reflexa, supra callo crassiusculo labro juncta.

Diam. maj. 31 millim., min. 24; alt. 32.

This species is rather like *N. uber*, Valenciennes, from Peru, but has a different columellar callosity, and the columella itself is not so straight. *N. rapulum*, Reeve, is the same species as *N. uber*.

***Natica decipiens*, n. sp.**

Pl. ii, fig. 23.

Testa parva, globosa, anguste umbilicata, lutescens, lineis undulatis numerosis luteis picta, infra suturam zona alba fusco-maculata, circa basim anfractus ultimi maculis fuscis notata, et infra umbilicum fusco tincta; spira brevis obtusa; anfractus quatuor, convexi, lineis incrementi striati, ultimus antice oblique descendens; apertura albida; columella callo fusco umbilicum semiobtegente instructa.

Diam. maj. 9 millim., min. 6.5 ; alt. 8.

Allied to *N. queketti*, Sowb., but differently coloured, the body-whorl descends more, and there are differences in the umbilical opening and the columellar callus

***Rissoina alfredi*, n.sp.**

Pl. ii, fig. 24.

Testa elongata, acuminata, alba ; anfractus circiter 10, normales septem fere plani, oblique costati, costis leviter arcuatis, circiter 14, ultimus costis infra undulatis instructus, circa basim inter costas tenuiter latus ; apertura obliqua, acuminata ovalis ; labrum paulo incrassatum ; columella callo tenui reflexo induta.

Longit. 7 millim., diam. 2.5.

A pure white shell with very oblique ribs and some fine striae around the base of the body-whorl, where the costae are slightly waved.

***Rissoa perspecta*, n.sp.**

Pl. ii, fig. 25.

Testa minuta, elongato-ovata, alba, pellucida, laevis ; spira obtusa, ad apicem rotundata ; anfractus 4, convexiusculi, infra suturam late hyalino-marginati, ultimus elongatus ; apertura parva, pyriformis, $\frac{1}{3}$ longit. totius subaequans ; peristoma continuum, leviter incrassatum, margine externo subpatulo, columellari, subreflexo, appresso.

Longit. 2 millim., diam. 1.

The form and colour are different in *R. conspecta* and the whorls are rounder. The peristome in the present species is thicker and a little patulous, and the pellucid margination below the suture is broader than in *conspecta*.

***Rissoa conspecta*, n.sp.**

Pl. ii, fig. 26.

Testa minuta, ovato-turrita, pallide fuscescens subpellucida, nitida, lineis incrementi tenuibus striata, imperforata ; spira ad apicem rotundata, obtusa ; anfractus 5 convexi, infra suturam hyalino-marginati ; apertura ovato-pyriformis, circiter $\frac{1}{3}$ longit. totius adaequans ; peristoma continuum, margine externo tenui, columellari leviter vel vix reflexo.

Longit. 2 millim., diam. 1.

A very small glossy shell, of a pale brownish colour, without any sculpture, excepting the lines of growth. The peristome is perhaps rather paler than the rest of the whorl.

***Eulima distincta*, n.sp.**

Pl. iii, fig. 1.

Testa parva, breviter subulata, alba, polita, ad apicem haud acuta, varicibus pluribus instructa ; anfractus 8 fere plani, infra suturam leviter obliquam zona angusta pellucida ornati, ultimus ad medium obtuse vel obsolete angulatus ;

apertura piriformis; labrum leviter incrassatum; columella arcuata, anguste reflexa.

Longit. 4.5 millim., diam. 1.5.

The slightly thickened labrum and the varices, or former labra, are the peculiar features of this species.

***Eulimella nivea*, n.sp.**

Pl. iii, fig. 2

Testa alba, elongata, subulata, nitens, minute spiraliter substriata et lineis incrementi tenuibus sculpta; anfractus circiter 12 fere plani, sutura profunda leviter obliqua sejuncti, ultimus ad peripheriam rotundatus; apertura parva, rotunde subquadrata; labrum tenue; columella incrassata, reflexa.

Longit. 10 millim., diam. 2; apertura 1.3 longa.

A long, gradually tapering shell, consisting of numerous slowly increasing whorls which are separated by a deep suture. All three examples have lost the protoconch.

***Eulimella minor*, n.sp.**

Pl. iii, fig. 3.

Testa elongata, gracilis, alba, polita, subpellucida; anfractus 10, duo apicales globosi, sinistrales, transversim siti, caeteri fere plani, sutura obliqua distincta sejuncti, infra suturam zona subopaca angusta cincti, ultimus ad peripheriam rotundatus; apertura subpiriformis; labrum simplex; columella leviter incrassata et reflexa.

Longit. 5 millim., diam. 1; apertura .75 longa.

A narrower shell than *E. nivea*, with longer, more rapidly increasing whorls. It is also more pellucid and exhibits an infrasutural zone.

***Turbonilla gemmula*, n.sp.**

Pl. iii, fig. 4

Testa minima, pellucida, nitens, costis numerosis flexuosis obliquis tenuibus instructa; anfractus normales sex, convexi, sutura profunda obliqua sejuncti, ultimus costis infra medium obsoletis; apertura parva, irregulariter ovata; columella rectiuscula, levissime incrassata et reflexa.

Longit. 3.5 millim., diam. 1.

A very small pellucid shell with 17—18 oblique and slightly flexuous ribs, six normal whorls and a globose protoconch, consisting of about two whorls. Apparently there is no spiral sculpture of any kind.

***Turbonilla decora*, n.sp.**

Pl. iii, fig. 5.

Testa elongata, alba; anfractus normales sex convexi, longitudinaliter oblique tenuiter costati, inter costas spiraliter striati, sutura obliqua profunda sejuncti, ultimus costis infra medium plus minus obsoletis, lineisque spiralibus haud interruptis; apertura longit. totius circiter $\frac{1}{4}$ aequans; columella vix incrassata, leviter reflexa, haud plicata.

Longit. 4 millim., diam. 1.

The embryonic sinistral shell forms a globose apex and consists of about two and a half whorls. The ribs on the penultimate whorl are about twenty in number and the spiral striae about ten.

***Trifora fuscescens*, n. sp.**

Pl. iii, fig 6.

Testa parva, gracilis, fuscescens, quadricingulata, cingulo supremo aliis majori, planiusculo, caeteris subaequalibus rotundatis; anfractus circiter 18, fere plani, ultimus cingulis septenis. prope aperturam lineis incrementi sectis et subgranosis cinctus; apertura parva, rotunde quadrata, antice brevissime oblique canaliculata; labrum tenue, postice ad suturam sinuatum, in medio subpatulum, ad marginem leviter crenulatum.

Longit. 11.5 millim., diam. 2.25.

Some of the specimens named *T. cingulatus*, A. Ad., by Mr. Sowerby (Marine Shells of S. Africa, p. 36), belong to the present species. None of them agree with Adams' species, which was described from the Red Sea, and has strong longitudinal sculpture between the spirals.

***Trifora fusecomaculata*, n. sp.**

Pl. iii, fig 7.

Testa elongata, gracilis, alba, fusco irregulariter maculata; anfractus circiter 20 planiusculi, lente accrescentes, quadricingulati, cingulis tuberculatis, duobus medianis aliis majoribus, longitudinaliter sulcati, subcancellati, ultimus infra peripheriam cingulis tribus haud granosis ornatus; apertura rotunde quadrata, antice breviter oblique canaliculata; columella supra arcuata, callo tenui induta.

Longit. 17 millim., diam. 3.5.

Var. (Pl. iii, fig. 8) Testa angustior, minor, cingulis tribus, superioribus aequalibus, distinctius et confertim tuberculatis.

Longit. 15 millim., diam. 3

The typical form is more distinctly blotched with brown than the variety.

***Trifora convexa*, n. sp.**

Pl. iii, fig. 9.

Testa parva, fusca, ad apicem albida; anfractus 10 convexi, supremi duo pallidi, laeves, caeteri tricingulati, cingulis granosis, duobus inferioribus magis conspicuis, sutura filiformi sejuncti, ultimus ad peripheriam rotundatus, cingulis sex instructus; labrum subpatulum; columella callo crasso pellucido induta, supra incurva.

Longit. 5.5 millim., diam. fere 2.

The suture is marked by the lira which encircles the periphery of the body-whorl, and winds up the spire at, but above the actual suture.

Ethalia africana, n. sp.

Pl. iii, figs. 10, 11.

Testa minuta, depressa, orbicularis, pellucido-alba, nitens, supra et infra plus minusve spiraliter microscopice striata; spira depressa; anfractus tres, celeriter accrescentes, ultimus callo conspicuo supra instructus, et infra callo crasso umbilicale munitus, ad peripheriam rotundatus; apertura fere circularis, marginibus callo columellari crasso junctis.

Diam. maj. 1.75 millim.; alt. fere 1

Remarkable on account of the callosity upon the upper surface of the body-whorl. Very like *E. perspirua* and *E. lurida*, A. Ad., from China and Japan, but with more basal callus, besides the callosity upon the upper surface. It is the *Teinostoma lucidum* of Sowerby's "Marine Shells of S. Africa," p. 13.

Cynisea fortileostata, n. sp.

Pl. iii, figs. 12, 13.

Testa *C. granulosa* similis, sed costis spiralibus crassioribus et minus numerosis instructa.

Diam. maj. 7.5 millim., alt. 6.

This species is of the same form as *C. granulosa*, Dunker (= *C. granulatam*, A. Ad.), but is distinguished by its fewer and stronger spiral ridges. They are seven in number on the body-whorl and prettily granular in well-preserved specimens, the one bordering the deep umbilicus being especially strong. In Dunker's species the ribs number 4—5 on the upper surface of the last whorl and 6—7 below. The colour of this species is white, sometimes dotted with pink above upon the ridges.

Retusa truncatula (Bruguière).

Utriculus truncatulus, Bruguière: Jeffreys, Brit. Conch., vol. iv, p. 421; Pilsbry, Man. Conch., vol. xv, p. 205, pl. xxi, figs. 11, 12, pl. xxiii, figs. 62—64.

Hab.—N. Europe, Mediterranean, Adriatic, Canaries.

I believe this species has been erroneously quoted by Mr. Sowerby as *Cylichna umbilicata*, Mont. (Marine Shells S. Africa, p. 52).

Ampullarina africana, n. sp.

Pl. iii, fig. 14.

Testa minima, irregulariter ovata, perforata, pallide fuscescens; anfractus 5, convexi, laeves, sutura profunda juncti; apertura concolor, piriformis; peristoma continuum, margine columellari albo, reflexo, externo intus prope insertionem incrassato.

Longit. 4 millim., diam. 3.

A small species without any striking characters. The surface is smooth, excepting very faint lines of growth. The whorls are very convex, and the suture almost channelled. The upper part of the whorls is more opaque than the lower portion, the shell being thickened within. This is seen within the aperture at the upper part.

Cultellus decipiens, n.sp.

Cultellus pellucidus, Sowerby (non Pennant): Marine Shells S. Africa,
p. 54.

Testa *C. pellucido* similis, sed major, latere antico longiore.

This species is very like the well-known *C. pellucidus*, Pennant, of the British coast, but attains large dimensions, the largest specimen examined being 53 millim. in length. The position of the beaks is proportionately further back, so that the anterior portion of the shell is rather longer. The strengthening rib within the valves, which is in front of the hinge teeth, is longer, straighter and almost parallel with the dorsal edge.

Semele capensis, n.sp.

Pl. iii, figs 15, 16.

Testa parva, antice latior, postice acute rotundata, fere aequilateralis, compressa, albida, radiatim tenuissime striata, lineisque incrementi distantibus lamelliformibus ornata; umbones acuti, laeves; sinus pallii profundus, rotunde acuminatus; cicatrix antica elongata, postica latior.

Longit. 11 millim., alt. 8, diam. 3.5

This species may attain larger dimensions than those here given. Its sculpture (Fig. 16) recalls that of certain *Tellinae* such as *T. tessellata*, Desh., *T. carnicolor*, Hanley, etc.

Theora ovalis, n. sp.

Pl. iii, fig. 17.

Testa parva, tenuissima, ovalis, alba, fere aequilateralis, antice subbrevior, postice vix angustior; valvae nitidae. incrementi lineis tenuissimis striatae, mediocriter convexae; umbones parvi, acuti, leviter prominentes; dens cardinalis unicus in utraque valva, et fossa ligamenti margine incrassato pone limitata.

Longit. 9.5 millim., alt. 7, diam. 3.5.

There are only the faintest indications of lateral teeth on the hinder margin in each valve, and I cannot trace any pallial sinus.

Tellina regularis, n. sp.

Pl. iii, fig. 18.

Testa parva, inaequilateralis, tenuis, subpellucido-albida, vel dilutissime fuscescens, concentricè tenuissime striata; margo dorsi anticus rectiusculus, leviter descendens, posticus brevior, magis declivis; latus anticus acute rotundatum, posterius subrostratum; dentes cardinales valvae dextrae duo divergentes; dens lateralis anticus brevis, prope umbones situs, posticus longior, tenuior; dentes cardinales valvae sinistrae duo, laterales nulli; sinus pallii profundissimus.

Longit. 14 millim., alt. 10, diam. 4.5

Some specimens are marked with radiating, broken-up, hair-like pellucid lines.

***Macoma litoralis*, Krauss.**

This is the *Tellina* (*Macoma*) *calcareosa* of Sowerby's *Marine Shells*, S. Afr., p. 57, and is separable from that northern species by its rather more equilateral form and by the pallial line which generally extends across the valves, reaching practically from scar to scar. The shell is sometimes white and sometimes reddish, and attains larger dimensions than the specimen described by Krauss. The largest example examined is 35 millim. in length.

***Lucina despecta*, n. sp.**

Lucina columbella, Sowerby (non Lamarck): *Marine Shells* S. Africa, p. 61.

Testa *L. columbellae* paulo similis, sed tenuior, liris concentricis magis confertis, lunula infra umbones haud excavata, sulco obliquo postico minus profundo, umbonibus laevibus, haud concentricis liratis, marginibus valvarum intus laevibus, haud denticulatis.

Longit. 23 millim., diam. 16, alt. 24

Hab.—Port Elizabeth (Sowerby); Port Alfred (Turton).

Some specimens are white beneath the thin pale deciduous periostracum, others are rose tinted externally and of a deeper shade within. The hinge is more delicate than in *L. columbella*, especially the lateral teeth. It is remarkable that so distinct a shell should have been confused with that species.

***Lucina valida*, n.sp.**

Pl. iii, fig. 19.

Testa parva, solida, alba, subpiriformis, inaequilateralis, confertim concentricis lirata et radiatim striata, umbones prominentes, acuminati, incurvati; valvae crassae, sulcis 2—3 remotis concentricis sculptae intus ad marginem ventralem minute crenulatae.

Longit. 7 millim., alt. 7, diam. 4.

Belonging to the same group as *L. pecten*, Lamk., but smaller, and more solid. The two or three grooves at intervals are peculiar, and apparently indicate periods of arrested growth. The radiating striae cut across the concentric lirae and give them a somewhat granose appearance. The lirae are closely packed, being merely separated from one another by striae-like grooves.

***Loripes clausus*, Philippi.**

Lucina clausa, Philippi: *Abbild.*, vol. iii, p. 101, pl. ii, fig. 2.

Loripes lacteus, Linn: Sowerby, *Marine Shells* S. Africa, p. 61.

This South African shell is quite distinct from the European *L. lacteus*, being rather flatter, much larger, having a deeply excavated lunule, and differing in other respects as pointed out by Philippi.

Lepton fortidentatus, n.sp.

Pl. iii, fig. 20.

Testa parva, triangulariter ovata, aequilateralis, mediocriter convexa, alba, undique conspicue punctata, lineisque incrementi hic illic striata; margo dorsi utrinque declivis, vix curvatus, ventralis late arcuatus; latera acute rotundata; dens lateralis crassus prope umbonem in utraque valva, posticus gracilior.

Longit. 5.5 millim., alt. 4, diam. 2.5.

Remarkable on account of the pitted surface, very like that of a finely punctate thimble.

Tellimya similis, n.sp.

Pl. iii, fig. 21.

Testa parva, leviter compressa, oblonga, utrinque rotundata, inferne rectiuscula vel in medio incurva, leviter inaequilateralis, nitida, lineis incrementi striata; margo dorsi utrinque declivis; latus anticum rotundatum, posticum paulo angustius; dentes duo divergentes valvae sinistrae subvalidi et margo utrinque umbonem valvae dextrae prominens; pagina interna laevis, nitida.

Longit. 6.5 millim., alt. 4.5, diam. 2.5.

Allied to *Tellimya producta*, Smith, from St. Helena, but less convex, longer in proportion to the height, and with longer, stouter, and more divergent teeth in the left valve.

Cardita (?) minima, n.sp.

Pl. iii, fig. 22.

Testa oblique subpiriformis, minima, mediocriter compressa, laevis, incrementi lineis tenuibus striata, pellucido-alba, vel pallide rosea, lineis opacis, albis, plerumque interruptis et guttatis, radiatim picta, radiis duobus, rufescentibus aliquando ornata; umbones acuminati, antice curvati; margo dorsi posticus elongatus, curvatus, anticus brevior, concavus; lunula excavata, margine distincto circumdata; cardo validus, dente unico in valva sinistra, duobus in valva dextra, postico valde prominente, margine postico valvae sinistrae et antico valvae dextrae sulco instructo; pagina interna albida, vel rosacea, radiata, margine ventrali leviter dentato.

Longit. 3 millim., alt. 3, diam. 2.

Provisionally placed in the genus *Cardita* until more specimens are available, so that the hinge-characters can be more thoroughly examined. Allied to *Cardita elata*, Sowerby, but not costate like that species, and different in colour and form.

Carditella laticosta, n.sp.

Pl. iii, fig. 23.

Testa parva, oblonga, compressa, valde inaequilateralis, alba, interdum rufo maculata, costis radiantibus latis curvatis et instructa, lineisque incrementi striata; margo dorsi anticus brevis, valde declivis, posticus longior, vix

descendens, ventrali fere parallelus ; latus anticum anguste rotundatum, posticum latius, oblique curvatum ; umbones parvi, acuti ; lunula angusta, excavata ; pagina interna alba, radiatim fortiter sulcata, supra marginem dorsalem rufo tincta.

Longit. 7.5 millim., alt. 4.5, diam. 3.

The hinge is normal, consisting of a single cardinal tooth in the right valve and two in the left, with two laterals in each valve, whereof the anterior in the right and the posterior in the left are a little stouter than the others.

Hochstetteria velaini, n.sp.

Pl. iii, fig. 24.

Testa parva, obliqua, tenuis, alba, lineis pellucidis in medio radiata, inaequilateralis, nitida, convexa, incrementi lineis striata, supra latus posticum lira tenui, ab umbone usque ad marginem producta, instructa ; latus anticum obliquum, parum arcuatum, posticum leviter incurvatum ; umbones prominentes, incurvati ; linea cardinis crassa, fere recta, transversim striata, in medio fossa ligamenti triangulari sculpta ; pagina interna marginibus ventrali et postico crenulatis.

Longit. 3.5 millim., alt. 4, diam. 2.5.

The slender lira on the posterior side runs down a shallow depression in the valves, which causes the faint sinuation in the outline. Named after the author of the genus.

Hochstetteria limoides, n.sp.

Pl. iii, fig. 25.

Testa minima, ovato-subpiriformis, alba, fere aequilateralis, radiatim tenuissime costulata ; latus anticum oblique truncatum, leviter excavatum, posticum curvatum ; umbones prominentes ; linea cardinis crassa, transversim striata, in medio fossa ligamenti angusta obliqua interrupta, ad extremitatem posticam infra dentibus lateralibus duobus tuberculiformibus instructa ; pagina interna leviter radiatim sulcata, ad marginem tenuissime denticulata.

Longit. 2.6 millim., alt. 3.3, diam. 2.

As regards form and the radiating costae, this species has the appearance externally of a minute *Lima*.

Modiola tenerrima, n.sp.

Pl. iii, fig. 26.

Testa parva, oblonga, tenuis, antice angustata, postice paulo dilatata, pallida, purpureo tincta, maculata et lineata, lineis incrementi tenuissimis sculpta, antice infra umbones sulcis 2—3 radiantibus ornata ; margo dorsi rectus, pulcherrime minute denticulatus, ventralis levissime incurvatus ; pagina interna margaritacea, lineis rufo-purpureis subundulatis variegata.

Longit. 13 millim., alt. 7, diam. 4.5.

Quite distinct from any of the other S African mussels. The most remarkable feature is the prettily dentate dorsal margin of the valves, the crenulation extending on both sides the umbones. The two or three radiating sulci at the anterior end are visible within the valves also.

***Limopsis pumillo*, n.sp.**

Pl. iii, figs. 27, 28.

Testa minima, trigona, crassa, alba vel rufo maculata, laevis; margo dorsi utrinque valde declivis, rectiusculus, ventralis curvatus; umbones peculiare, quasi truncati; cardo crassissimus, dentibus anticis tribus, posticis quaternis munitus; sulcus ligamenti profundus; pagina interna radiatim striata; cicatrices profundae.

Longit. 3 millim., alt. 3.25, diam. 2.

Remarkable for the strength of the hinge and the peculiar umbones which have the appearance of being truncate, but, when the tip is closely examined, appear to have a circular cap.

***Lima perfecta*, n.sp.**

Pl. iii, fig. 29.

Testa parva, convexa, alba, radiatim costata et sulcata, costis granosis, sulcis aequantibus, clausa, antice oblique truncata, profunde excavata, postice et inferne regulariter curvata; valvae crassiusculae; area dorsalis parva, excavata, fossa ligamentali obliqua triangulari sculpta; pagina interna radiatim sulcata, ad marginem late dentata.

Longit. 12 millim., alt. 15, diam. 10.

The costae are about eighteen in number, exclusive of a few finer ones near the posterior margin, and those in the anterior excavation which are also finer than those on the central part of the valves.

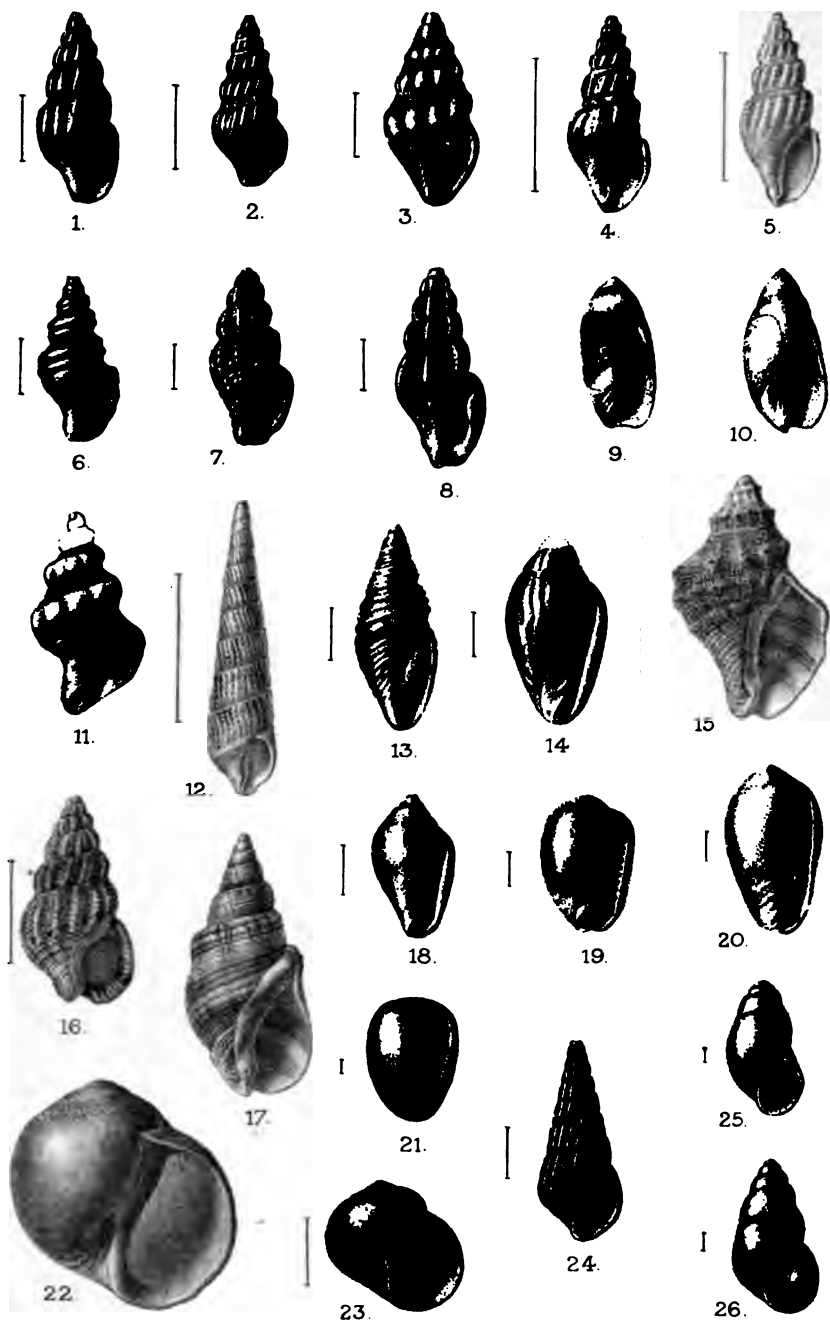
EXPLANATION OF PLATES.

Plate II.

- | | |
|--|---|
| Fig. 1. <i>Drillia thetis</i> , n. sp. | Fig. 14. <i>Marginella munda</i> , n. sp. |
| Fig. 2. <i>Drillia subcontracta</i> , n. sp. | Fig. 15. <i>Purpura texturata</i> , n. sp. |
| Fig. 3. <i>Drillia albonodulosa</i> , n. sp. | Fig. 16. <i>Nassa pœcilosctica</i> , n. sp. |
| Fig. 4. <i>Drillia fractermussa</i> , n. sp. | Fig. 17. <i>Bullia trifasciata</i> , n. sp. |
| Fig. 5. <i>Drillia nivosa</i> , n. sp. | Fig. 18. <i>Marginella pura</i> , n. sp. |
| Fig. 6. <i>Clathurella crassilirata</i> , n. sp. | Fig. 19. <i>Marginella differens</i> , n. sp. |
| Fig. 7. <i>Glyphostoma siren</i> , n. sp. | Fig. 20. <i>Marginella dulcis</i> , n. sp. |
| Fig. 8. <i>Mangilia alfredi</i> , n. sp. | Fig. 21. <i>Marginella pœustes</i> , n. sp. |
| Fig. 9. <i>Ancilla albozonata</i> , n. sp. | Fig. 22. <i>Natica napus</i> , n. sp. |
| Fig. 10. <i>Ancilla reevei</i> , n. sp. | Fig. 23. <i>Natica decipiens</i> , n. sp. |
| Fig. 11. <i>Fusus cingulatus</i> , n. sp. | Fig. 24. <i>Rissoina alfredi</i> , n. sp. |
| Fig. 12. <i>Terebra suspensa</i> , n. sp. | Fig. 25. <i>Rissoa perspecta</i> , n. sp. |
| Fig. 13. <i>Mitromorpha volva</i> , Sowb., var. | Fig. 26. <i>Rissoa conspecta</i> , n. sp. |

Plate III.

- | | |
|--|---|
| Fig. 1. <i>Eulima distincta</i> , n. sp. | Fig. 16. <i>Semele capensis</i> , sculpture |
| Fig. 2. <i>Eulimella mixta</i> , n. sp. | Fig. 17. <i>Theora ovalis</i> , n. sp. |
| Fig. 3. <i>Eulimella minor</i> , n. sp. | Fig. 18. <i>Tellina regularis</i> , n. sp. |
| Fig. 4. <i>Turbonilla gemmula</i> , n. sp. | Fig. 19. <i>Lucina valida</i> , n. sp. |
| Fig. 5. <i>Turbonilla decora</i> , n. sp. | Fig. 20. <i>Lepton fortidentatus</i> , n. sp. |
| Fig. 6. <i>Trifora fuscescens</i> , n. sp. | Fig. 21. <i>Tellinya similis</i> , n. sp. |
| Fig. 7. <i>Trifora fuscomaculata</i> , n. sp. | Fig. 22. <i>Cardita minima</i> , n. sp. |
| Fig. 8. <i>Trifora fuscomaculata</i> , var. | Fig. 23. <i>Carditella laticostata</i> , n. sp. |
| Fig. 9. <i>Trifora convexa</i> , n. sp. | Fig. 24. <i>Hochstetteria velaini</i> , n. sp. |
| Figs. 10, 11. <i>Ethalia africana</i> , n. sp. | Fig. 25. <i>Hochstetteria limoides</i> , n. sp. |
| Figs. 12, 13. <i>Cynisca forticostata</i> , n. sp. | Fig. 26. <i>Modiola tcnerrima</i> , n. sp. |
| Fig. 14. <i>Amphullarina africana</i> , n. sp. | Figs. 27, 28. <i>Limopsis fumilio</i> , n. sp. |
| Fig. 15. <i>Semele capensis</i> , n. sp. | Fig. 29. <i>Lima perfecta</i> , n. sp. |

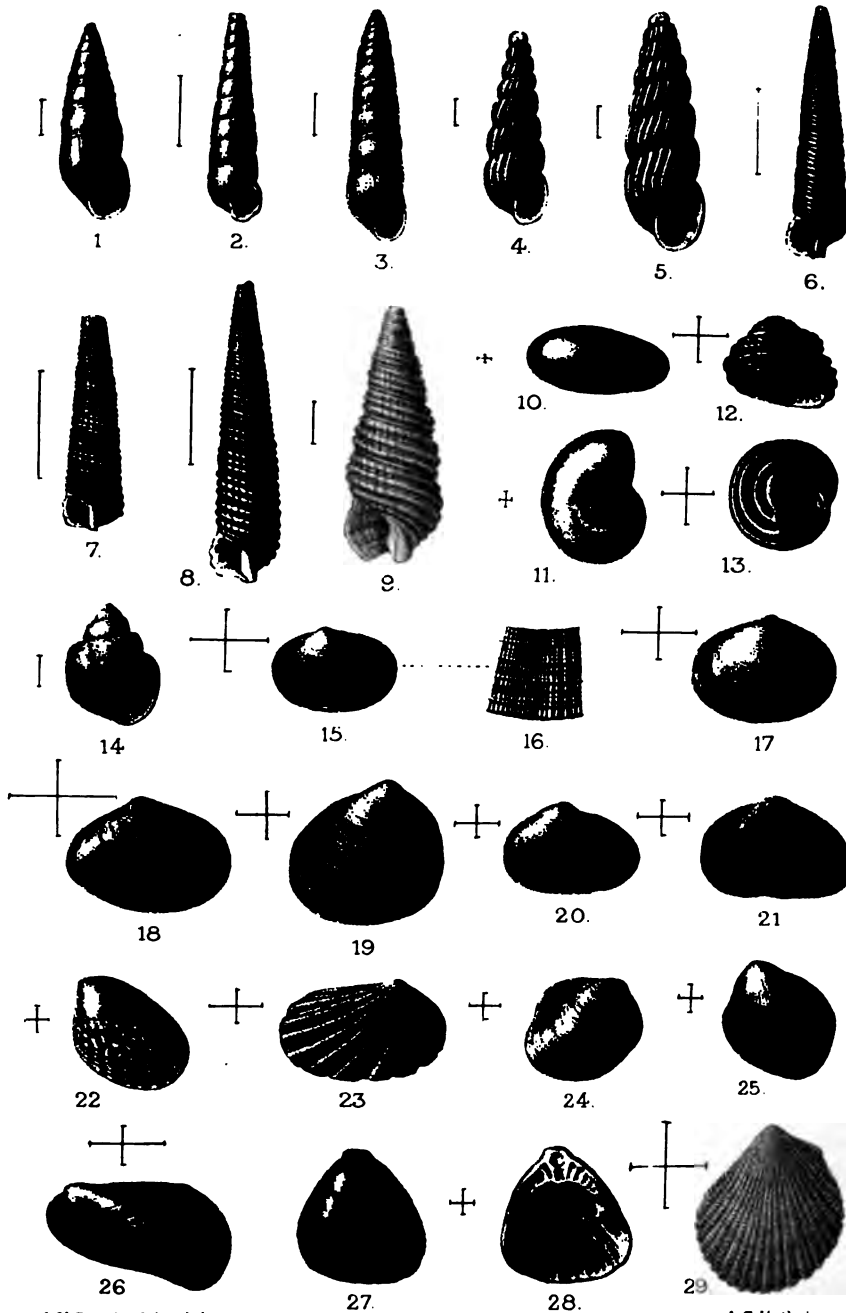


A.H. Searle, del. et lith.

A.S. Huith imp.

NEW SPECIES OF SOUTH AFRICAN MARINE SHELLS.





A.H Searle, del et lith.

A.S Huoh, imp

NEW SPECIES OF SOUTH AFRICAN MARINE SHELLS.



NOTE ON CORILLA ERRONELLA, NEV., MS.

BY G. K. GUDE, F.Z.S.

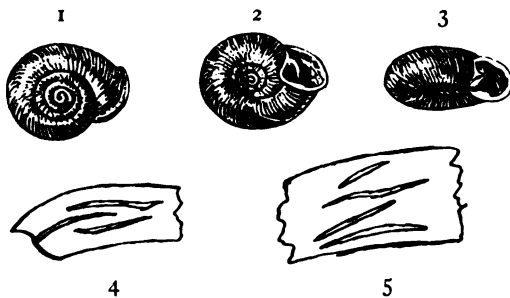
THE collection of the late Hugh Nevill, which came under the hammer at Stevens' Sale Rooms on the 10th of May last, contained a number of shells of *Corilla*, which, at first, I was inclined to regard as a new species.

The lot was acquired by Mr. H. B. Preston, who kindly placed several of the specimens at my disposal and upon closer examination the shell in question appears to be identical with one which Colonel Beddome received years ago with the manuscript name *Helix erronella*, Nev., Ceylon, and which I figured and named provisionally *Corilla erronea*, var. *erronella* (Science Gossip, (N.S.) III, (1896) p. 127, fig. 16.) The large amount of material now at command enables one to form a more accurate estimate as to its rank, and in view of the constant and considerable differences both in the ordinary shell characters and in the armature, I have no hesitation in according it specific rank. Unfortunately no record of the precise habitat has been found, but there can be no doubt that the shells were collected in Ceylon.

I am now in a position correctly to define the species and to illustrate the armature more fully from specimens opened for that purpose.

Corilla erronella, Nev., MS.

Shell discoid, elliptic, widely umbilicated, dark corneous, or chestnut; a little shining above, polished below, finely and regularly ribbed; spire plane, suture



impressed; whorls $4\frac{1}{4}$ to $4\frac{1}{2}$, slightly flattened above, rounded at the periphery, tumid below, increasing slowly at first, the last suddenly widening and dilated at the aperture, deflected in front, constricted behind the peristome; nepionic whorls ($1\frac{1}{2}$) almost smooth. Aperture nearly horizontal, ovate-obcordate, margins distant, united by a sinuous fold on the parietal wall. Peristome fuscous or pinkish, thickened and well reflexed; upper margin very shortly ascending at first, then descending, with a more or less strong inward inflection; outer margin curved, lower margin with a strong oblong tubercular tooth. Parietal armature consisting of three elongated curved folds: the

first (upper) shortest; the second longest, united to the sinuous fold at the aperture, free posteriorly; the third—near the lower suture—slowly ascending posteriorly. Palatal folds four: the first (upper) shortest, slightly curved, descending posteriorly; the second longest, the anterior half ascending, the posterior half almost horizontal; the third, a little longer than the first, scarcely curved, descending very obliquely posteriorly; the fourth nearly as long as the second, curved parallel with, and near to, the lower suture, and reaching nearly to the aperture.

Major diam. 16—18, minor 12.5; alt. 5.5 millim.

Hab.—Ceylon. Type in Col. Beddome's collection.

From *Corilla erronea*, Alb., its nearest ally, *C. erronella* differs in its more regular contour and its smaller size. The riblets are more pronounced and more regular and do not anastomose, while the incised spiral lines on the lower surface, so conspicuous a feature in *C. erronea* and many of its allies are usually lacking. In the armature there are considerable differences: the second parietal fold, which in *C. erronea* is united posteriorly to the first, is here quite free posteriorly. The palatal folds are generally shorter and much nearer the peristome, being all visible from the aperture; while the third fold, which in *C. erronea* is very short and nearly horizontal, is here longer and obliquely descending. Figs. 1—3 show the shell in three different positions, while a diagrammatic view of the armature is given in figs. 4 and 5, the former showing the parietal folds and the latter exhibiting the palatal folds as they appear within on the outer wall. A number of immature shells show the usual five palatal folds, the first four very oblique, the fifth small and horizontal, but no parietal barriers, which do not appear to be formed until the shell reaches maturity.

DESCRIPTION OF A NEW SPECIES OF *ARIUNCULUS* FROM ALGERIA.

By WALTER E. COLLINGE, M. Sc.,
The University, Birmingham.

SOME short time ago I received from Mr. P. Pallary a number of live specimens of Algerian slugs, amongst which was the specimen forming the subject of this paper. Unfortunately there was only a single specimen, but Mr. Pallary has very kindly promised to try and procure more, in order that a more detailed account may be given of the generative organs and a coloured figure of the animal.

I have much pleasure in associating the name of Mr. Pallary with this interesting species.

Ariunculus pallaryi, n. sp.

Animal (alive) reddish-brown, darker medio-dorsally, with three faint, ill-defined, blackish lines running from the posterior border of the mantle to the tail, where they converge; mantle smooth, light brown, with faint reddish tinge, which latter quickly disappears on placing in alcohol; head and tentacles yellowish-brown, darker dorsally. Rugae elongated, flat, clearly marked by definite sulci. Caudal gland well defined, but partially hidden by the margin of the foot. Respiratory orifice situated towards the anterior end of the mantle. Generative orifice about half way between the right upper tentacle and the respiratory orifice. Peripodial groove sharply marked. Foot-fringe and foot-sole lighter in colour, latter divided into median and lateral planes.

Length (alive) 72 millim.; (in alcohol) 50.

Shell a thick, somewhat pyriform calcareous plate.

Maj. diam. 6.2 millim., min. 4.

Hab.—Echmühl, Oran, Algeria (P. Pallary).

This, the largest known species of *Ariunculus*, at first sight gives one the impression of an elongated form of *Arion subfuscus*, Drap. Anatomically it is very distinct from any of the described species.

The vestibule of the generative organs leads into an elongated vagina, which suddenly widens out to form a large globular sac, with a somewhat complicated internal structure. From the posterior and outer border of this sac the receptacular duct is given off, while ventrally and slightly anteriorly is a large retractor muscle. On the same side at the anterior end is the free-oviduct, and at the opposite side and posteriorly the sperm-sac arises.

The remaining organs have not yet been examined in any detail.

SOME RECENT SLUG PAPERS.

By D. F. HEYNEMANN.

Frankfort on Main.

Dr. Simroth has recently sent me two papers on Slugs, a group of molluscs upon which he has been working for many years with inexhaustible zeal and success.

The first is on the *Philomycidae* and *Arionidae* (Sitz. ber. naturf. Gesell. Leipzig, Jan. 14th, 1902) of which, as well as the second, the reprint is just coming to hand. A more detailed treatise of the two families is promised, which will be published in Tokio, in the meantime a preliminary account is given, which draws into the range of discussion, in the course of various divisions devoted to anatomy, such genera as *Oopelta*, *Anadenus*, etc. Of the genus *Philomycus* the following are treated of: *P. striatus*, v. Hass., from Java, *P. balius*, n.sp., and *P. tonkinensis*, n.sp., both from Tonkin, *P. taiwanensis*, n.sp., from Formosa, *P. doederleini*, n.sp., from the Island of Liu-Kiu, *P. bilineatus*?, Bens., from the Japanese Islands, *P. melachlorus*, n.sp., from Tsu-shima, an island between Japan and Korea, and *P. viperinus*, n.sp. from Japan.

The second paper has the title "Ueber die von Herrn Dr. Neumann in Abessinien gesammelten aulacopoden Nacktschnecken (Zool. Jahrb. (Abth. f. Syst.), 1903, Bd. 19). Of the three families discovered, viz., the *Vaginulidae*, *Limacidae*, and *Urocyclidae*, the concurrence of which in the Abessinian highlands presents a most remarkable circumstance, the *Vaginulidae* are reserved for a later occasion and only the genera *Agriolimax*, *Atoxon*, and *Spirotoxon* are dealt with. The following are described as new: *Agriolimax afer*, *uataalerensis*, *gardullanus*, *gofanus*, *glandulosus*, *koehanus*, *kontanus*, *concrementosus*, *kaffanus*, *abessinicus*, *deckeni*, *gimirranus*, *fuscus*, and *limacoides*, the latter as the link between *Agriolimax*, Mörch, and *Lehinannia*, Heyn.

After Dr. Simroth's recent description of a similarly large number of species of this genus from the Caucasus (Die Nacktschnecken des Russischen Reiches, 1901), where he locates the centre of origin of the genus, it certainly surprises me to see described such a variety of species from a very distant district, without an example of any of those of the Palaearctic region. Dr. Simroth, however, does not fail to give an explanation, he considers the difficulty to be very simply solved by the Pendulum theory, which has been defended and perfected by him. The theory of the pole of oscillation between Sumatra in the east, and Equador in the west; the only points in the world which have retained their equatorial position from early times, and from which the remains of ancient species existing then in refuge, could spread according to the temporary changes in the formation of dry land along the equator again, and from there northwards and southwards, according to Dr. Simroth.

In the *Urocyclidae* there are described from the Neumann collection, *Atoxon erlangeri*, *Spirotoxon neumanni*, and from the former collection of Stuhlmann *S. stuhlmanni*.

Finally the opportunity is taken to set up a new genus *Varania*, with a single new species *V. loennbergi*, found in the stomach of a species of *Varanus* in Cameroon by Mr. Loennberg of Upsala.

There were also found at the same time some 60 or 70 *Veronicellas*.

Simroth assumes that Slugs from the Cameroons have up to the present been unknown, but he overlooks the fact that he himself has reviewed a work by Adolf d'Ailly (*Contributions à la connaissance des Mollusques terrestres et d'eau douce de Kaméroun*), in which various slugs are mentioned, e.g. *Aspidelus chaperi*, Morelet, *Vaginula pleuroprocta*, v. Martens, and *Urocyclus buchholzi*, v. Martens, and that he declared the *Urocyclus* to be very like his *Dendrolimax continentalis*.

NOTES.

Note on *Testacella hallotidea*, Drap. My garden at Aldenham abounds in this curious slug. In digging over last year's celery bed, the gardeners turned it up by dozens, and I observed that it was numerous in a series of broad bands stretching across the bed, while in other parts of the area it was absent. These broad bands represented the former position of the celery trenches: doubtless the manure attracted the worms, and the worms the *Testacella*. Perhaps it was for a similar reason that we found it abundant on an old marrow bed.

As a rule, it was living at a depth of about 12 inches. On four separate occasions I found it on the surface; twice under large flint stones, once under a heavy elm log, the latter being in a part of the garden never under cultivation. On the fourth occasion I noticed a large specimen crawling across a wide gravel walk at eleven o'clock on a fine bright morning. This seemed to me remarkable, for I have never before observed the creature taking a voluntary walk in the upper world, and there was no indication that my specimen had been the prey of a bird, nor had there been any disturbance of the soil anywhere near.

Since the above was written, I have satisfied myself by repeated observation, that the *Testacella* habitually crawls about on the surface of the ground.

A. H. COOKE.

Note on *Parmacella deshayesii*, Moq.-Tand. In February last Mr. P. Pallary sent me a number of living slugs from Echmühl, Oran, Algiers, amongst which were some examples of *Parmacella deshayesii*, Moq.-Tand. Some of these I turned out in the garden beneath a mass of cabbage and lettuce leaves. On March 26th, I noticed they were pairing, and a few days later there were two or three groups of eggs averaging a dozen each. The eggs of this mollusc are oval, and when deposited have a pearly lustre, which, however, quickly disappears leaving them a dead opaque white. The maximum diameter is 6 millim., and the minimum 4. On April 27th, about a third had hatched out and I was hoping I should be able to rear them, but turning over the lettuce leaves on May, 7th, I found all had been killed by the night frosts, as well as some adults which arrived on April 21st.

WALTER F. COLLINGE.

CURRENT LITERATURE.

Hoyle, William E.—Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of Alexander Agassiz, on the U.S. Fish Commission Steamer "Albatross," from August, 1889, to March, 1900. Commander Jefferson T. Moser, U.S.N., Commanding. Report on the Cephalopoda. Bull. Mus. Comp. Zool. Camb., Mass., 1904, vol. xliii, pp. 1—71, pls. 1—12, text figs. A—G.

The collection here described by Dr. Hoyle consists of thirty species, distributed in nineteen genera, of which the following are new: *Stauroteuthis hippocrepium*, *Frockenia clara*, gen. et sp. nov., *Tremoctopus scalensus*, *Polypus oculifer*, *Cirrobrachium filiferum*, gen. et sp. nov., *Loligo diomedea*, *Rhynchoteuthis chuni*, *Mastigoteuthis dentata*; in addition to these, there are a few forms to which the author has not found it possible to affix names.

A List of Stations, with the species obtained at each is given, and an Appendix treats of the Luminous Organs of *Pterygoteuthis giardi* and *Abraliopsis hoylei*.

The paper is beautifully illustrated. In the preparation of certain plates the author remarks that he has "utilised a number of water-colour drawings made on the expedition by Mr. Agassiz and Mr. Magnus Westergren whilst the animals were still fresh and the colours of life retained. It would be well if this practice had been followed on other expeditions, as the appearance of Cephalopoda changes very markedly after preservation in alcohol."

Melvill, J. Cosmo.—Descriptions of twenty-three species of Gastropoda from the Persian Gulf, etc. Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 51—60, pl. v.

Melvill, J. Cosmo.—On *Berthais*, a proposed new genus of Marine Gastropoda from the Gulf of Oman. Ibid., pp. 61—63, figs. 1, 11.

The type of this genus was described some short time back as *Scala (Constantia) intertexa*, Melv. & Stand. Since then Mr. Melvill has submitted the shell to Dr. Dall, who regards it as belonging to a new genus. Its nearest ally, Mr. Melvill regards as *Actis*, while *Constantia* is not far removed.

As has already been suggested by Mr. Edgar A. Smith, *Onoba egregia*, A. Ad., also belongs to the same genus.

Melvill, J. Cosmo.—Note upon *Oliva gibbosa*, Born, and its limits of variation. Ibid., pp. 64, 65.

Burne, R. H.—Notes on the Nervous System of the Pelecypoda. Ibid., pp. 41—47, figs. i—iii.

Collinge, Walter E.—Some Remarks on the genera *Damayantia*, Issel., *Collingea*, Simr., and *Isselentia*, Cllge. Ibid., pp. 9—12.

Collinge, Walter E.—Contributions to the Terrestrial Zoology of the Faroes. By Nelson Annandale. Land and Freshwater Mollusca. Proc. Roy. Physical Soc. Edinb., 1904, vol. xv, pp. 153, 154.

Simroth, Heinrich.—Über *Ostracolethe* und einige Folgerungen für das System der Gastropoden. Zeit. f. wiss. Zool., 1904, Bd. lxxvi, pp. 612—672, T. xxxii.

Dr. Simroth here gives a more detailed account of *Ostracolethe fruhstorferi* described in 1901, and which he regards as synonymous with *Myotesta*, Cllge.

Simroth, H.—Über Philomyciden and Arioniden. SB. Naturf. Gesell. Leipzig, 1901 pp. 32—45.

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ON SOME NEW SPECIES OF MELANIA AND JULLIENIA
FROM YUNNAN AND JAVA.

BY HUGH FULTON.

(Plate iv.)

Melania aeruginosa, n. sp.

Pl. iv, fig. 1.

SHELL solid, dark rusty brown, smooth, surface somewhat shining, sculptured with a few distant oblique and rather obtuse folds, prominently channelled at the suture, the margin of which, especially on the last whorl, is rather prominent; apex eroded, $5\frac{1}{2}$ whorls remaining, almost flat, aperture sub ovate, bluish-grey within; peristome thin, sinuous above.

Maj. diam. $13\frac{1}{2}$; alt. 33 millim.

Hab.—Soekaboemi, Java.

Strongly characterised by its canaliculate suture.

Melania dulcis, n. sp.

Pl. iv, fig. 2.

Shell rather thin, dark brown, elegantly ornamented by spiral rows of small granules, six on the last whorl, with two other less granular striae below. Apex slightly eroded, $7\frac{1}{2}$ whorls remaining, slightly convex; aperture broadly ovate, light bluish-grey within, the interstices between the external granules showing through as darker-coloured squarish spots; peristome very thin.

Maj. diam. 13; alt. 44 millim.

Hab.—Yunnan-fu Lake, Yunnan.

A distinct and very elegant species.

Melania fortitudinis, n. sp.

Pl. iv, fig. 3.

Very solid, yellowish-olive colour, spirally striated, seven or eight spiral costae on the last whorl, crossed by oblique folds which are prominently noduled

above, margined at the suture by a somewhat depressed nodulous channel. Apex somewhat eroded. 6 whorls remaining, moderately convex, aperture narrowly ovate, bluish-grey within, peristome acute

Maj. diam. $12\frac{1}{2}$: alt. 37 millim.

Hab.—Sookaboemi, Java.

This species has some superficial resemblance to the Ceylon form *M. broti*, Dohrn, but that has coarser sculpture and the whorls increase more rapidly.

***Melania lauta*, n. sp.**

Pl. iv, fig. 4.

Shell thin, dark brown, ornamented by spiral rows of granules. Apex eroded, 4 whorls remaining, slightly convex; aperture ovate, bluish-grey within; peristome rather thin.

Maj. diam. 12 : alt. 28 millim.

Hab.—Yunnan-fu Lake, Yunnan.

In general character very like *dulcis*, but much shorter and much more deeply depressed at the basal area of the columella

***Jullienia carinata*, n. sp.**

Pl. iv, fig. 5.

Shell subglobular, whitish, covered by a light yellowish-brown periostracum, middle whorls somewhat darker than apex and body-whorl; slightly rimate or excavated at the umbilical area; whorls $4\frac{1}{2}$, rapidly increasing, with very fine arcuate lines of growth, otherwise smooth, with two keels, a rather thick and prominent one at the periphery and a less developed one situated below the suture of the latter part of the last whorl; aperture sub-oval, very oblique; peristome continuous, rather thick, whitish and shining.

Maj. diam. $5\frac{1}{2}$: alt. 5 millim.

Hab.—Yunnan-fu Lake, Yunnan.

The nearest form known to me is *Jullienia costata*, Poir., but that species is easily separated by its less globular form and spiral costae.

**ON A COLLECTION OF
LAND SHELLS FROM GEBI ISLAND, MOLUCCAS,
WITH DESCRIPTIONS OF NEW SPECIES.**

BY HUGH FULTON.

(Plate iv.)

THE species noted in this paper were collected by Mr. John Waterstradt on the island of Gebi, which is situated about midway between Waigiou and Halmahera Islands.

1.—**Xesta aulica**, Pfr.

2.—**Planispira kurri**, Pfr.

Numerous varieties occur of this species and the variation in size is remarkable; the following are the dimensions of two extreme forms:—

A. Maj. diam. (including peristome) 21; alt. 10 millim.

B. " " " 30; " 13 "

3.—**Papuina unicolor**, Pfr.

Helix unicolor, Pfr.: Proc. Zool. Soc., 1845, p. 64.

Ampelita unicolor, Pils.: Tryon's Man. Moll., vol. vi, p. 37, pl. 5,
figs. 74–76.

An interesting discovery, as the habitat of this species was hitherto unknown, and owing to its similarity in form to some species of *Ampelita*, it had been thought by some to be from Madagascar.

4.—**Papuina fallax**, n. sp.

Pl. iv, figs. 6, 7.

Shell somewhat depressed, narrowly perforate, rather thin, apex dark brown, following whorls yellowish-brown, the last being darker in colour and subangulate at the periphery which is ornamented by a very narrow dark brown spiral band; umbilicus encircled by a yellowish patch; suture well defined by a whitish line; whorls 5, moderately convex, slowly increasing, last descending; aperture sub-oval, grey within; peristome moderately expanded, slightly reflected, dilated at point of insertion, almost covering the umbilicus.

Maj. diam. 27; alt. 19 millim.

This species has a remarkable resemblance both in form and colouration to the Cuban *Cepolis* (*Coryda*) *alauda*, v. *strobilus*, Fér. Quite distinct from any other species of *Papuina* known to me, the nearest being *P. labium*, with which, however, it cannot be confused.

5.—*Albersia subsphoerica*, n. sp.

Pl. iv, figs. 8, 9.

Shell subglobose, moderately solid, imperforate, medium dark brown with a darker narrow spiral band bordered below by a similar one of a yellowish colour situated a little above the periphery of last whorl and continued for a short distance at the suture; covered throughout by oblique rows of close-set hair-scars; whorls $4\frac{1}{2}$, moderately convex, rapidly increasing, last shortly descending; aperture subcircular, outer band showing faintly through; peristome slightly expanded, broadened at point of insertion, a circum-umbilical dark patch, inner columellar edge white, ending abruptly below with a rather acute angular projection.

Maj. diam. 24; alt. 17 millim.

Near *A. pseudocortusia*, Strubell, but slightly more globose, the whorls are more closely coiled and the hair-scars are more numerous. The lines of growth in *pseudocortusia* are rather conspicuous at the suture, giving it a somewhat crenulated appearance, whereas in *subsphoerica* the suture is simple.

Of the three specimens before me one does not show the tooth-like projection noted in the description of the type, and the third specimen only shows it very faintly.

6.—*Leptopoma gebiensis*, n. sp.

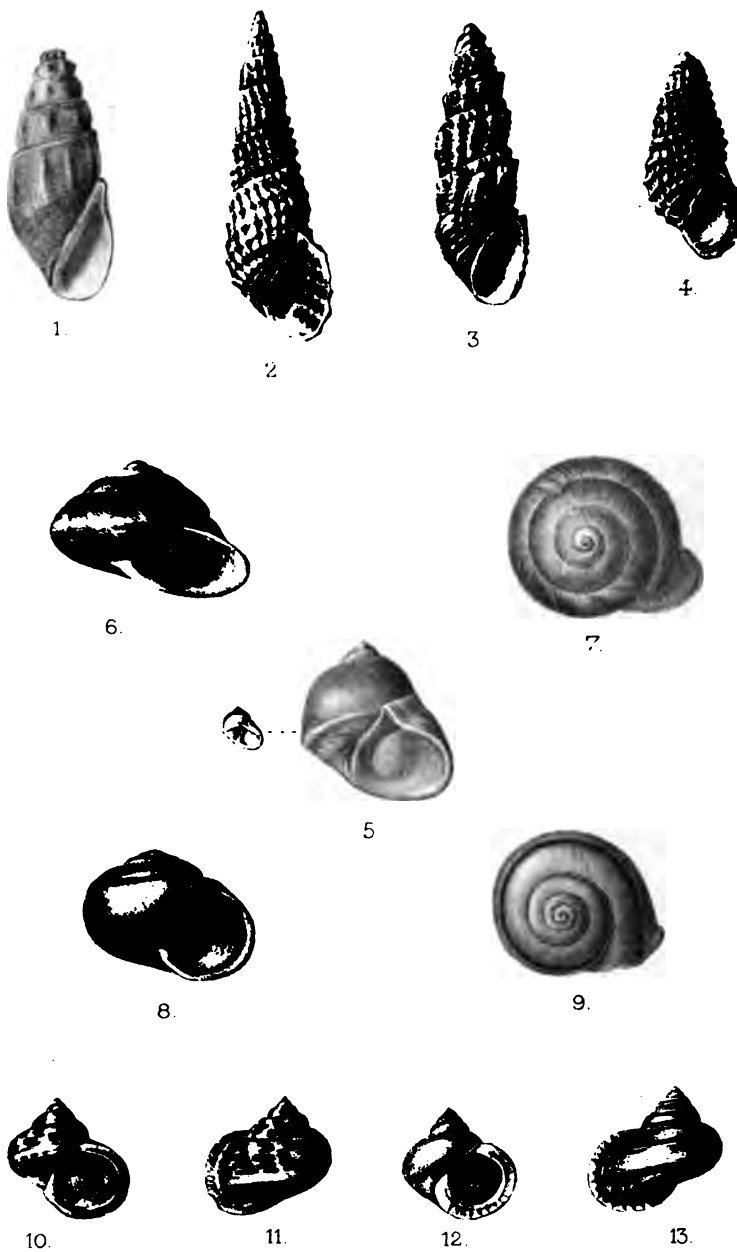
Pl. iv, figs. 10, 11.

Shell umbilicated, subconic, moderately thick, colouration variable, generally whitish ground with reddish-brown spiral bands which are often more or less interrupted, last whorl with eight white striae, one at the periphery, four above and three below, between these are numerous much finer striae; whorls $5\frac{1}{2}$, moderately convex, last rather acutely keeled in front; aperture circular, spiral striae showing through the interior; peristome expanded, double (in adult specimens), inner edge more or less exserted, white, columellar portion narrow, broadening at lower part; operculum normal.

Maj. diam. 17; alt. 15 millim.

" 14; " 12 "

Similar in form to *L. crenilabre*, Strubell, but that species is much smoother, the peristome is less oblique and the last whorl is rounded in front, not moderately keeled as in *gebiensis*.



A.H Searle, del. et lith

A.S. Huth, imp.

NEW SPECIES OF LAND AND FRESHWATER SHELLS.

NOTE ON LEPTOPOMA CRENILABRE, STRUBELL.

By HUGH FULTON.

(Pl. iv. figs. 12, 13)

THE above species was described by Bruno Strubell in the Nachr. d. d. Malak. Gesell., 1872, p. 48. In Martini & Chemnitz, 1902, pt. clxx, p. 412, pl. 52, figs. 1—5, Kobelt describes and figures a shell purporting to be Strubell's *crenilabre*.

Having had the opportunity of examining the type specimens of *crenilabre* from the Strubell Collection, I find that they do not agree with Kobelt's description and figures, but do agree with the original description.

L. crenilabre is very near *L. vitreum*, but is of a thicker substance, and readily distinguished by the back of the peristome being more or less reticulated. Strubell describes it as being smooth, but by the aid of a lens one can just discern several spiral keels standing out from the usual microscopic spiral striae.

The shell figured by Kobelt is probably a variety of *halmaherium*, Strubell.

I give a figure of the type specimen (Pl. iv, fig. 12), and of a banded and larger specimen (fig. 13) from the collection of the late Bruno Strubell.

EXPLANATION OF PLATE IV.

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|---------------|---|
| Fig. 1. | <i>Melania aeruginosa</i> , n. sp. |
| Fig. 2. | <i>Melania dulcis</i> , n. sp. |
| Fig. 3. | <i>Melania fortitudinis</i> , n. sp. |
| Fig. 4. | <i>Melania lauta</i> , n. sp. |
| Fig. 5. | <i>Jullienia carinata</i> , n. sp. |
| Fig. 6, 7. | <i>Papuina fallax</i> , n. sp. |
| Fig. 8, 9. | <i>Albersia subsphaerica</i> , n. sp. |
| Figs. 10, 11. | <i>Leptopoma gebiensis</i> , n. sp. |
| Figs. 12, 13. | <i>Leptopoma crenilabre</i> , Strubell, |

ON CERTAIN DEPOSITS OF SEMI-FOSSIL SHELLS
IN HAMAKUA DISTRICT, HAWAII,
WITH DESCRIPTIONS OF NEW SPECIES.

BY H. WETHERBEE HENSHAW.

(Plate v.)

THE island of Hawaii, the youngest as well as the largest of the Hawaiian group, has received comparatively little attention from conchologists. This neglect no doubt is in no small degree due to the fact that the *Achatinellidae*, which have chiefly excited the interest of students, are but sparingly represented on Hawaii, there being but three species, and these by no means the most conspicuous of the group. The discovery, therefore, of deposits of fossil, or rather of semi-fossil, shells in the Hamakua district, containing a number of undescribed species, is not without interest. Before adverting to the deposits, a brief description of the region is necessary to a proper understanding of their relation to the present fauna.

The districts of Kohala and Hamakua comprise the northern end of the island of Hawaii. This is by far the oldest part of the island, and probably it had grown ancient before the fires that resulted in the upbuilding of the huge mountain mass of Mauna Kea to the south, and the still more recent Mauna Loa, were yet kindled. With little doubt then the northern end of Hawaii was first to receive its fauna from the much older islands to the north, and it in turn served as a nursery for the rest of the island as its lavas were upheaved from the depths of ocean, cooled, and were slowly clothed with vegetation.*

* The extraordinary development of the *Succineidae* upon the island of Hawaii suggests the possible hypothesis that this island, the present metropolis of the group, was the first of the Hawaiian islands to receive the *Succinea* stock, and that the other islands have been successively colonized from it rather than the converse. Even when the present comparatively extensive deforestation of the more northerly islands of the group is taken into account, the relative scarcity of the *Succineidae* upon them is difficult to understand. Dating back in origin to a vastly greater antiquity than Hawaii, the northern islands would naturally be assumed, upon a priori grounds, to have received their *Succinea* stock first; hence they should be richer in species than the comparatively recent island; the contrary is true.

There is, however, one important factor of the problem not to be overlooked. The *Succineidae* appear to have had the island of Hawaii pretty much to themselves from the very first, the comparative scarcity of other land shells there, leaving them practically without competition. Thus favoured by a comparatively free field, and with a general environment extremely favourable to their habits, the *Succineas*, though perhaps with a long start upon the other islands, having later obtained a foothold upon the big island may have attained their present rich development upon it in a comparatively short time.

As a factor in the development of the species of a group, time would appear to be a less important element than favourable environment and, above all, freedom from direct competition.

The principal competitors of the *Succineas* for food are the genera *Amastrea* and *Leptachatina*, perhaps *Carelia*, and the *Zonitidae*. All of these, but especially *Amastrea*, live chiefly upon decaying vegetation and perhaps upon the fungi found thereon. The island of Hawaii is poor in species of all these groups, *Carelia* being wholly absent, nor as a rule are any of these species strongly represented by individuals.

Upon Oahu the *Achatinellidae* proper, the *Amastreas* and the genus *Auricula* have attained a development equalled upon no other island although both Maui and Molokai are greatly favoured by the former. Upon Kauai the genus *Leptachatina* has differentiated an extraordinary number of species (many yet undescribed), and this genus and *Carelia*, the latter found upon no other island, appear to have pre-empted the field. Thus several of the islands seem to have favoured one or two groups which, having once gained the ascendancy, have been able to hold it against all molluscan competitors.

Much of the coast line of Hamakua is very precipitous, especially near Waipio Valley, the cliffs there rising sheer to a height of 600–800 feet. Formerly no doubt the forest extended clear to the brink of the cliffs, but for many years past waving sugar cane has usurped the place of the forest, ever creeping steadily upwards, until now the cane fields have reached a final limit of about 1,800 feet.

Above the present limit of the cane is a belt of forest. Most of this has been fenced from cattle for the past twenty years to preserve the water supply, and in many places the land is as densely covered as it ever was with kukui, ohias, and with the usual variety of ferns, shrubs and plants that go to make up the Hawaiian forest. As rare inhabitants of the depth of this forest, but more abundant on its edges and in the partial openings, are found *Succinea inconspicua*, Ancey, *S. bicolorata*, Ancey, *S. kuhnsii*, Ancey, one or two others of the genus and a number of the minute species of land shells.

There are portions of this forest-belt where the timber is very thin, and here live on the ahakea (*Bobea elatior*, Gaud.), the ohias (*Metrosideros polymorpha*, Gaud.), and the koolea trees (*Myrsine lisseriana*, A. D. C.), the *Achatinella horneri*, Baldw., and the *A. hawaiiensis*, Baldw., species which seem to wholly shun the dense forest and inhabit only isolated trees where light and warmth abound. This open forest section has been invaded by the all-conquering "Hilo grass" (*Paspalum conjugatum*) which apparently is destined to materially affect the future of both the forest and the shells. It grows here most luxuriantly in a dense mass which effectually screens the earth from the life-giving sun, and smothers in its embrace all the seeds that fall from the trees above. To the presence of this grass in the open district here described, I attribute the fact, that, though fenced from cattle, there are absolutely no young trees coming forward, the probable result being the extinction, in the not distant future, of the trees and the shells inhabiting them.

Above the timbered belt just mentioned, and distant from the sea some six miles, are the so-called Waimea Plains. To the north and west are the Kohala mountains, which rise to the height of about 8,000 feet.

To-day the plains are almost entirely treeless, except here and there for scattered pua trees which form the home of the *Achatinella physa*. There still stand, however, many skeleton trunks of the ohia and koa trees, whose naked and broken branches like outstretched arms, seem raised in protest against the fate that has overtaken them and their fellows lying on the ground. Less than fifty years ago it is said to have been impossible to ride anywhere over the present plains except by trails because of the multitude of fallen tree trunks that everywhere blocked the way. This brings the forest down to comparatively recent times, and there is no reason to doubt the generally received tradition that a century ago the present plains were covered with an impassably dense forest, a fact essential to remember in connection with the fossil remains to be described presently.

That this forest was of the usual island type is certain, and it consisted for the most part of ohia and koa together with numerous smaller trees like the pua, kopiko, ahakea, tree lobelias and many other shrubs and berry bearing trees, with the usual tangle of ieie vines and ferns.

The forest, proper, probably never extended in this region much, if any above 3,000 or 3,500 feet. Above this altitude the slopes are steeper and the soil more scanty and rocky. Here the mamani begins to be numerous, a tree which indicates a thin and poor soil, a scanty rain supply and a considerable altitude.

The region of the Waimea plains appears never to have had a large (as compared with some other parts) rainfall. In the absence of definite data it may be assumed to be not far from 40 inches at Mana on their upper border, that figure being the average for several years in the town of Waimea as given by Professor C. J. Lyons. A small rainfall would seem to be indicated also from the fact that nowhere on the plains appear marked evidences of erosion. The deep gulches which gash the windward side of the island at short intervals are on the plains conspicuous by their absence, although nowhere are they deeper and more numerous than a few miles to the north east in the rainy Kohala mountain district. The Kohala mountains in fact, seem to intercept and rob the trades of their moisture before they reach the plains. The surface of the plains is by no means flat, but is gently and in places quite steeply rolling. On their upper edge and probably on the very edge of the former forest, at an altitude of about 3,000 feet, occur the semi-fossil deposits which form the subject of this paper. The fossils have been found in two distinct localities, viz., at Mana and at Palihoukapapa. The two places, however, are only about four miles apart, and though the latter is several hundred feet higher than the former, to all intents they may be considered conchologically to be one and the same. There is, however, some difference in the character of the deposits at the two places. At Mana the shells occur in the horizontal strata, two or three inches thick, and under a deposit of about a foot of humus. The very primitive digging implements at the writer's disposal prevented anything like a thorough examination of the extent of the deposits, but the evidence all goes to show in that in no one spot are they extensive. All that were found were included within an area of a few hundred square yards, the shell-bearing strata in some spots occupying only a few square feet, in others a few square yards.

At Palihoukapapa the deposits are, or seem to be, even less extensive, and instead of being in horizontal strata are in the nature of pockets, sometimes containing a bushel or more of shells. Over how large an area here the deposits occur there are no present means of telling.

I see no reason to doubt that the shells in both localities are entirely local in origin, and that they were swept into their present position by water resulting from local freshets. In certain favoured localities in the islands, shells

of various species occur in extraordinary abundance. In the case of the deposits in question it need be assumed only that an unusual mortality occurred simultaneously among the shells of a certain district, such as invariably follows a forest fire, and that there shortly ensued a deluge that washed the dead shells into their present abiding place. The gentle slope of the land around the deposits in both localities entirely favours this supposition.

That the shells forming the deposits cannot have been carried from any considerable distance is proven by the condition of vast numbers of the fossil *Succineas*, many of which when cleaned from dirt might almost seem to have been alive but yesterday. The steeper slopes of Mauna Kea are not more than four miles to the south west of the localities in question, but the general lay of the land, and the fact that a well defined ridge intervenes, forbids the assumption that the shells originated on the distant slopes of the mountain and were transported to their present position, even if the condition of the shells themselves did not prove the contrary.

The humus above the fossils in both localities is perfectly homogeneous, and the general absence in it of shells is especially noteworthy, indicating to the writer that the destruction of the fossils resulted from the destruction of the forest, or at any rate occurred at about the same time, the locality then ceasing, except in a small way, to be a shell producing one. Had the forest persisted after the deposition of the fossils, the humus overlying the fossils would contain evidence of the fact in the presence of shells, either of the same or of other species, which would have re-populated the forest. The grass in the neighbourhood still shelters a few small species like *Leptachatina* and *Tornatellina*, and it is probable that the genera *Pupa* and *Microcystis* are still represented here and there although none rewarded our search. Specimens of *Succinea konaensis*, Sykes, were found hard by, and the *Achatinella physa*, Newc., also is found in the neighbourhood. Dead shells of the above species were found on the surface of the ground and perhaps an inch or so below, but further down they seem to be entirely wanting.

In connection with the question of the age of the deposits, it is to be said that the humus everywhere presents the appearance of having been laid down by the natural decay and deposit of the tropical vegetation. Nevertheless, I cannot think that such is the case, but believe that most of the humus above the shells must have been washed into place subsequent to the deposit of the shells. The deposition of a foot of humus by natural decay, even in a luxuriant semi-tropical forest, must require several hundred years, and the condition of the shells generally would seem to negative any such age. It is true that in a few places the shells have been reduced to lime, all semblance of their form and character having disappeared. On the other hand, thousands of the frail *Succineas*, *Tornatellinas*, and *Pupas*, as well as many of the more substantial species like the *Amastras* and the *Achatinellas* are but slightly affected by time.

That the deposits of fossils are confined to the two localities in question is not for a moment to be believed. A well-worn trail at Palihoukapapa, and some deep holes dug by cattle at Mana, chanced to reveal the presence of the shells in these two localities ; but no doubt there are similar deposits in many other places on the Waimea Plains and elsewhere in the northern end of the island. Indeed the author has heard that in the district of Kohala such deposits are by no means uncommon.

In a paper published in 1887 (Hawaiian Annual), Mr. D. D. Baldwin speaks of extensive portions of the Hamakua and Kona districts at altitudes of 3,000 to 5,000 feet, "where the soil is filled with millions of sub-fossil shells of this [*Succinea*] family." In a recent letter to the writer, Mr. Baldwin mentions these deposits more in detail, and states that he made several hurried trips to the region above Honakaa and in the vicinity of Waimea in the years from 1865 to 1872 and again in 1878. In all of the open country above the forest, the ground was "white with dead *Succineas* and probably other shells. The shells were quite evenly distributed through the light surface soil." Later, through the agency of floods, the surface shells here mentioned may have been swept into pockets and so formed deposits similar to those examined by the writer.

Indeed, in several specimens of *Succinea*, faint traces of colour are still visible, the original deep red or maroon having faded to pink. The same is true of some of the smaller shells.

In a climate like that of Arizona and in dry earth even frail shells might be preserved almost intact for several hundred years; but the climate of the Waimea plains is by no means a dry one in this extreme sense. Heavy dews are the rule all through the year, and rains are probably frequent enough to keep the humus damp all the time except in seasons of drought when it is likely to dry for a few inches only from the top. That frail shells like the *Succineas* could long be preserved in damp and porous humus, even though a foot from the surface, is not credible. All things considered, it does not seem likely that the fossil shells date back more than a century, and it is probable that they and the forest perished at the same, or nearly the same time.

As to some extent confirmatory of the theory of the recent age of the shells, the writer has recently learned that about fifty years ago, more or less, an extensive forest fire raged in this section, and this may have been the cause of the simultaneous destruction of such vast quantities of mollusca.

The following *Succineas* are believed to be undescribed species. All four are without doubt extinct in the region in question.

In examining several thousand specimens of these semi-fossil *Succineas*, one cannot fail to be impressed with the considerable diversity in shape and size of individuals, presumably of the same species. The difficulty in treating such materials consists not in the finding of new species but rather in the exercise of due restraint in naming forms evidently closely related to living

species but exhibiting greater or less differences. Living species of this group are difficult enough of determination, even with the aid of abundant material and field notes. How much greater the chances of error with only fossil material available! The author has intended to be extremely conservative in describing forms, preferring to leave a few for future describers rather than to add to the number of synonyms, already too many, in this group.

***Succinea maxima*, n. sp.**

Pl. v, figs. 1, 2.

Shell elongate, narrow, rather thick, lines of growth fairly distinct. Spire very small, considerably less than $\frac{1}{3}$ the whole length of shell, conical, slightly produced, apex mammilliform, suture moderate. Whorls, 3; ultimate whorl very large. Aperture large, but slightly oblique, ovate, reduced above. Columella but slightly curved. Peristome simple, acute.

Long. 24, lat. 11.5 millim.; long. apert. 16 millim.

Hab.—Mana, Hamakua, Hawaii.

This species is without doubt the largest of the genus yet discovered in the Hawaiian Islands, and differs also otherwise from described forms. The axis of the shell is nearly medial, the apex forming but a very slight angle with the body of the shell. The apex is very small in comparison with the last whorl, averaging less than one-third the length of the latter. A single specimen of this species was found in the Palihoukapapa deposits, but the species abounds in those at Mana.

***Succinea mirabilis*, n. sp.**

Pl. v, figs. 3, 4.

Shell moderately thick and firm, acutely cone-shaped with very obliquely truncated base; lines of growth distinctly marked; spire relatively large, autish, mammilliform, composed of two convex whorls with well-defined sutures; aperture rather narrowly ovate, rather less than two-thirds the length of the shell; columella decidedly curved and slightly reflexed; peristome simple, acute.

Long. 16, lat. 8 millim.; long. apert. 11 millim.

Hab.—Palihoukapapa, Hamakua, Hawaii.

As regards its shape, this shell is far the most remarkable of Hawaiian *Succineas*, living or extinct. The lower whorl spreads widely, and the aperture is so oblique to the axis that, when the shell is placed on its base, the apex makes a very acute angle. The apex is also very large as compared with the lower whorl, being contained in the latter only twice. The species appears to be only moderately abundant in the deposits.

This species bears a very remarkable resemblance to the *S. infundibuliformis*, Gould, from Tahiti.

***Succinea pristina*, n. sp.**

Pl. v, figs. 5, 6.

Shell elongate, moderately thick (in large individuals very thick), lines of growth usually moderately marked (in some large specimens strongly so): spire produced, nearly half the length of shell, apex acute, suture moderate; whorls $3\frac{1}{2}$ —4; aperture only of moderate size, narrowly ovate, but slightly oblique to axis of shell; columella moderately curved; peristome simple, acute, thin.

Long. 17.5, lat. 8 millim.; long. apert. 8 millim.

Hab.—Mana, Hamakua, Hawaii

This species differs markedly from the previous one, especially in lacking the spreading base, and in the much less oblique aperture. Its relations are much closer with the *S. protrata*, Sykes. It appears, however, to have been much larger than this species, and the shell is much thicker, *protrata* being one of the most fragile of Hawaiian *Succineas*. *Pristina* appears to be even more closely related to the *S. provera*, Gould.

One individual, considerably the largest of fifteen, measures as follows: Long. 21, lat. 11 millim.; long. apert. 13 millim.

The colouration of this species when in life probably differed much from that of *protrata*, which is brown or horn colour. A single specimen of *pristina* has retained its colour sufficiently to show that the columella and base were of a deep red or maroon like the *S. thaunumi*, Anc., and the *S. bicolorata*, Anc.

***Succinea gibba*, n. sp.**

Pl. v, figs. 7, 8.

Shell broadly ovate; lower whorl large and strongly convex; lines of growth but slightly defined; spire very short, obtuse, mammilliform, of two whorls, less than one-third whole length of shell; suture shallow and narrow; whorls 3; aperture large, broadly ovate; columella much curved, slightly reflexed posteriorly; peristome simple, acute.

Long. 20, lat. 12 millim.; long. apert. 14 millim.

Hab.—Mana, Hamakua, Hawaii.

This species seems to be quite distinct from any of the insular forms. It is chiefly remarkable for its great size and for the very marked convexity of the lower whorl.

Below is appended a complete list of the semi-fossil shells found in the above mentioned localities. Thorough investigation of the deposits and of others in the northern part of Hawaii, will no doubt add other species to the list and also reveal additional undescribed forms.

The smaller species have all been identified by Mr. Ancey from material sent him, and the author is greatly indebted to this conchologist for a list of the forms detected by him including the new species. Where Mr. Baldwin or the author are responsible for the identifications, this fact is indicated by the name in brackets.

As will be noticed the greater number of forms from the deposits are of species still existing, either on Hawaii or the others islands. The list contains representatives of most of the genera of Hawaiian land shells, and the number of genera as well as species sufficiently attest the former wonderful richness in molluscan life of this particular region.

1. *Achatinella physa*, Newc.
Abounds in the deposits of Mana. Mr. Ancey is inclined to view this shell as a new variety because of its size, an idea at first shared by the author who now, however, adopts Mr. Baldwin's opinion of its specific identity with *physa*.
2. *Achatinella horneri*, Baldw. [Henshaw].
Two or three individuals only from Mana deposits which are several hundred feet above the present usual range of the species.
3. **Amastra senilis*, Baldw. [Baldwin]. Very abundant at Palihoukapapa.
4. * „ *fossilis*, Baldw. [Baldwin]. Common at Palihoukapapa.
5. „ *flavescens*, Newc. [Henshaw]. Rare in the Mana deposits but abundant enough living at an elevation of 2,000 feet or so.
6. **Amastra conica*, Baldw. [Baldwin].
7. * „ *sinistrorsa*, Baldw. [Baldwin].
8. **Pseudohyalinia meniscus*, Anc.
9. *Vitrea hawaiiensis*, Anc.
10. **Punctum horneri*, Anc.
11. *Endodonta laminata*, Pse.
12. „ *nuda*, Anc.
13. * „ *henshawi* Anc.
14. * „ *hystricella*, Pfr. var. *paucilamellata*, Anc.
15. „ *lanaiensis*, Sykes.
16. *Nesopupa acanthinula*, Anc.
17. „ *sp.*
18. „ *baldwini*, Anc. var. *centralis*, Anc.
19. *Lyropupa perlonga*, Pse.
20. * „ *mirabilis*, Anc. var. *hawaiiensis*, Anc.
21. * „ *magdalenae*, Anc. var. *prisca*, Anc.
22. *Leptachatina henshawi*, Sykes.
23. „ *konaensis*, Sykes.
24. „ *arborea*, Baldw.
25. „ *simplex*, Pse.
26. „ *sp.*
27. „ *imitatrix*, Sykes.
28. „ *sp.*
29. *Tornatellina newcombi*, Pfr. ?
30. „ *cincta*, Anc.
31. „ *procerula*, Anc.
32. „ *macromphala*, Anc.

64 HENSHAW: SEMI-FOSSIL SHELLS IN HAMAKUA DISTRICT, HAWAII.

- 33. " extincta, Anc.
- 34. " oblonga, Pse.
- 35. " compacta, Sykes.
- 36. " fusca, Anc.
- 37. * " rudicostata, Anc.
- 38. * " cyphostyla, Anc.
- 39. **Succinea* maxima, Hensh. [Henshaw]. Very numerous, Mana deposits.
- 40. * " gibba, Hensh. [Henshaw]. Numerous, Mana deposits.
- 41. * " mirabilis, Hensh. [Henshaw]. Not numerous in Palihouk-
apapa deposits.
- 42. * " pristina, Hensh. [Henshaw] Comparatively uncommon in
Mana deposits.
- 43. " inconspicua, Anc. [Henshaw]. Abundant in Palihoukapapa
deposits and also living over much of the region.
- 44. " konaensis, Sykes. [Henshaw]. Abundant in Palihoukapapa
deposits and also living in same region.
- 45. " aurulenta, Anc. [Henshaw]. Numerous in Palihoukapa de-
posits Found living as yet only in Kona.
- 46. " kuhnsii, Anc. [Henshaw]. Abundant in Palihoukapapa de-
posits : also living in same region

EXPLANATION OF PLATE V.

Figs. 1, 2. *Succinea maxima*, n. sp.

Figs. 3, 4. *Succinea mirabilis*, n. sp.

Figs. 5, 6. *Succinea pristina*, n. sp.

Figs. 7, 8. *Succinea gibba*, n. sp.

REPORT ON SEMI-FOSSIL LAND SHELLS FOUND IN THE HAMAKUA DISTRICT, HAWAII.

BY C. F. ANCEY.

(Plate v.)

THE shells listed in the following pages were discovered at a place called Palihoukapapa, on the Hamakua slope of Mauna-Kea, Kawaii, at an elevation of 4,000 feet. Professor Henshaw has kindly sent me some dirt in which the minute species were found. He reports other similar localities on the same island "where there are extensive deposits of fossilised land shells about a foot below the surface of humus. Nearly all the known genera of Hawaiian land shells are represented in these deposits by species, some still extant, others probably now extinct."

1.—*Pseudohyalinia meniscus*, n.sp.

Pl. v, figs. 9, 10.

Testa perdepressa, tenuissima, emortua alba, haud nitens, latissime umbilicata, sub lente striis obliquis incrementi, parum profundis, confertim exarata; spira leviter convexa vel fere plana, anfractus $3\frac{1}{2}$, regulariter sed subceleriter crescentes, convexi, sutura impressa, ultimus depressus, soepe ad aperturam leniter deflexus, infra concavus, umbilico tertiam partem diametri superante, apertura obliqua, transverse oblonga, parum lunata, margine supero antice convexi prodeunte; peristoma simplex, rectum, ad columellam haud dilatatum.

Diam. maj. $1\frac{2}{3}$, min. $1\frac{1}{3}$; alt. $\frac{1}{2}$ millim.

A more depressed shell than *P. kauaiensis*, Pfr., more distinctly sculptured and with a much larger umbilicus. It may be referable to *Charopa* rather than *Pseudohyalinia*.

2.—*Vitrea hawaiiensis*, n.sp.

Differt a *V. molokaiensis*, Sykes, et a *V. lanaiensis*, Sykes, testa magis elevata, anfractibus altius convolutis et umbilico minore; a *V. paucillo*, Gould, cui peraffinis differt etiam testa minus depressa, paulo convexiore, colore luteo-virescente, umbilico profundiore, circulari.

Diam. maj. $4\frac{1}{3}$, min. $3\frac{2}{3}$; alt. $2\frac{1}{3}$ millim.

The above description is from recent specimens found on Olaa, Hawaii, by Mr. Thaanum. A single specimen from Palihoukapapa is referable to his species.

3.—*Punctum horneri*, n.sp.

Pl. v, figs. 11, 12.

Testa depressa, tenuis, orbicularis, emortua albida vel pallide fulvida, apice pallidior laevigata excepto striis exilibus incrementi subtiliter exarata; spira convexa, parum elevata, obtusa; anfractus 4 convexiusculi, sutura impressa discreti, regulariter atque lente crescentes, ultimus convexiusculus, circa umbilicum mediocrem, quartam diametri partem paeno aequantem subdepressus; aperatura subobliqua, lunata, subrotundata; peristoma acutum, haud dilatatum, marginibus distantibus.

Diam. maj. 1, min. 1; alt. $\frac{1}{2}$ millim.

This minute shell is closely allied to the European *P. pygmaeum*, Drap. It is also recent on Oahu.

4.—*Endodonta laminata*, Pease.

Pl. v, figs. 13, 14.

Not hitherto recorded from Hawaii. The specimens of this and the following *Endodonta* retain their usual coloured brown stripes on a pale ground.

5.—*Endodonta (Thaumatodon) nuda*, Anc.

One or two imperfect examples seem to be referable to this species, originally described from fresh specimens from Olaa, Hawaii.

6.—*Endodonta (Thaumatodon) henshawi*, n.sp.

Pl. 5, figs. 15, 16.

Testa parva, orbicularis, emortua alba, vestigiis strigarum fuscum plerumque, superne praesertim eleganter lateque maculata, costulis acutis confertis (circa 45 in ultimo anfractu), radiantibus insculpta, haud nitida, aperte et mediocriter umbilicata; spira convexiuscula, parum elevata; anfractus 4—4 $\frac{1}{4}$ convexi, sutura impressa discreti, regulariter crescentes, ultimus cylindricus, flexuose costulatus; apertura parum obliqua, lunato-circularis, in pariete lamine duabus volventibus et in interiore basis marginis dextri denticulis 5 acutis aequidistantibus (2 superis soepe obsoletis) armata; peristoma simplex, ad columellam nullomodo dilatatum; umbilicus tertiam diametri partem haud superans.

Diam. maj. 2, min. $\frac{1}{2}$; alt. 1 millim.

This is the smallest member of the group of *E. contorta*, Fér., hitherto described. The apertural armature is very much alike in *E. nuda*, *E. ringens*, and *E. contorta*. A similar species, also probably extinct, but with a larger umbilicus, was detected by the Rev. E. W. Thwing, in an extinct crater of the Kona coast; it is undoubtedly another new species which I propose to name *E. thuringi*, after its discoverer. The present one, which seems to be abundant, is respectfully dedicated to Professor Henshaw, to whom I am much indebted for the whole of the material now considered, and for valuable notes on other Hawaiian shells.

7.—*Endodonta hystriella*, Pfr. var. *paucellamellata*, n. var.

Pl. v, fig. 17.

Testa orbicularis, rotuliformis, convexo-depressa, aperte sed mediocriter umbilicata (umbilicus circa 1 millim. latus), subfossilis alba, late fulvo strigata, strigis in ultimo anfractu fulminatis; costulis acutis, subarcuatis, dehinc flexuosis ornata; spira convexa, parum elevata, apice planato; anfractus 5 convexi, regulariter crescentes, sutura perimpressa, ultimus cylindricus, in adultis supra medium ad aperturam plano-declivis: apertura obliqua, lunato-rotundata, marginibus acutis haud expansis, pariete laminis volventibus 2, supera paulo validiore munito.

Diam. maj. vix 5, min $4\frac{1}{2}$; alt. 2 millim.

I have not been fortunate enough to procure authentic specimens of *E. hystriella*, but refer to Pfeiffer's species some shells from Makawao, Maui. These have, however, three palatal laminae, while in the subfossil form there are more. Hence these are possibly specifically distinct, as moreover the true *E. hystriella* has not yet been found on Hawaii. However, I prefer to subordinate them to the latter, because besides the laminae there are not many differences. It is right to observe that in some allied forms the palatal laminae present in typical examples are reduced in number or even wanting in others. I am therefore confident that *Nesophila*, Pilsbry, a sectional name based on that feature, has no value whatever, unless it may be retained for *Helix tiara*, Mighels, a large form of quite a distinct type, from the island of Kauai. In general shape and contour this is much like *Stephanoda dissimilis*, d'Orb., from Chili, but the palate is furnished with small parallel and numerous revolving lirae.

8.—*Endodonta lanaiensis*, Sykes.

A single good specimen. Greatest diam. 4, high $1\frac{1}{2}$ millim.

9.—*Nesopupa acanthinula*, Anc.

Rare, but frequent in a living state in Oahu, Hawaii, and probably other islands.

10.—*Nesopupa*, sp.

A single broken specimen, with the teeth of *Pupa newcombi*, but larger and more elongate. A similar but smaller form is found living on Oahu and Hawaii.

11.—*Nesopupa baldwini*, Anc. var. *centralis*, Anc.

Also found living at Olaa, Hawaii (Thaanum). This and others mentioned in the present paper will be fully illustrated in other contributions to the malacological fauna of the Hawaiian islands actually in the press. The typical specimens, with a more produced spire of $5\frac{1}{2}$ whorls are from Molokai and Maui.

12.—*Lyropupa perlonga*, Pease.

The identification is somewhat doubtful, as I have never met with Oahu specimens and all those I have seen from Hawaii (Palihoukapapa, Mana, and an extinct crater on the Kona coast) are subfossil. They are, however, in fair condition and of a brown or dark colour. The description and figure given by Boettger (Conch. Mittheil., i, p. 69, pl. xii, fig. 16) apply tolerably well to these. They measure $2\frac{1}{2}$ millim. in length and $1\frac{1}{2}$ in diameter, and have $5\frac{1}{2}$ whorls. The long superior palatal lamella extends on the peristome and forms, with a well developed angular fold a small, circular, nearly closed sinus. There are about 15 or 16 riblets on the last whorl.

Lyropupa perlonga and *L. costata*, Pease (= *culana*, Dall) are, I think, the only dextral forms of the group.

13.—*Lyropupa mirabilis*, Anc. var. *hawaiiensis*, n. var.

Pl. v. fig. 18.

Differt a typo (ex montibus "Waianae" insulae Oahu) testa plerumque paulo majore, robustiore, costulis pallidis, dente lamelliformi infero in fauce aperturæ magis valido et elongato; anfract. 6.

Long. $2\frac{1}{2}$, diam. $1\frac{1}{4}$, long. apert. $\frac{3}{4}$ millim.

There are twenty or twenty-two costulae on the last whorl, while in the type specimen there are about twenty-two to twenty-four, and there is no trace of a pale ill-defined zone on the last whorl. The angular lamella is weakly developed and scarcely produced, in fact reduced to a mere tubercle.

14.—*Lyropupa magdalenæ*, Anc. var. *prisea*, n. var.

Pl. v. fig. 19.

This form agrees pretty well with Boettger's figure of *Pupa lyrata*, Gould, (Conch. Mitth., i, p. 61, pl. xii, fig. 17), but I do not think it may be taken as the true *L. lyrata*. Numerous sinistral species and forms, all very much alike, have been shown to exist on the various islands of the Hawaiian group, and one of these, from Olaa, I have referred to *Pupa lyrata*, although I am by no means certain of the identity. Gould's description should equally be applied to other things, but not to species with a strong angular fold such as this. The diagnosis of the subfossil specimens of Palihoukapapa is as follows:

Differt a typo (ex Palama ins. Oahu) habitu plerumque magis cylindrico, costis validioribus, albescentibus, zonula pallida conspicua in parte superiore anfractus ultimi et rima umbilicari minus aperta.

Long. 23, lat. $1\frac{1}{2}$ millim.

I observed about 15 to 17 ribs on the last whorl, while I counted about 15 in the examples of the typical lot from Oahu. There are 14 in number in another new species detected at Olaa, Hawaii (*L. clathratula*), a form in which the upper palatal lamella does not reach the outer edge of the peristome. In *L. lyrata*, or rather the one I ascribe to *lyrata*, there are 12 strong distant

ribs on the last whorl ; its palatal folds are very close to each other, the most deeply seated (the inferior) beginning near the end of the superior. Besides, there is a very slight point-like denticle far within the base.

15.—*Achatinella physa*, Newc. var. *procera*, Anc.

I have not seen good full-grown examples, but refer, with some doubt, a very young shell to this.

Mr. Sykes has changed the well-known name *A. physa*, Newc., to *confusa*, Sykes, because he supposed *A. hawaiiensis*, Bald., to equal the true *physa*. Mr. Baldwin writes that his *hawaiiensis*, was discovered in a spot unexplored when Newcomb described his *physa*, hence the latter name may stand for what is generally distributed in collections, from the Kohala mountains and the Hamakua slope of Mauna-kea.

16.—*Amastra senilis*, Baldw.

17.—*Amastra fossilis*, Baldw.

18.—*Amastra*, sp.

A juvenile specimen, with conic spire and keeled body-whorl, probably distinct from the former species.

19.—*Leptachatina henshawi*, Sykes.

Probably referable to this species, although not so strongly sculptured.

20.—*Leptachatina konaensis*, Sykes.

21.—*Leptachatina arborea*, Baldw.

22.—*Leptachatina simplex*, Pease.

23.—*Leptachatina* sp.

A puzzling form, somewhat like the Maui *L. grana*, Newc.

24.—*Leptachatina imitatrix*, Sykes.

25.—*Leptachatina*, sp.

Like the latter, but larger and with a more produced spire.

26.—*Tornatellina newcombi*, Pfr. (?)

27.—*Tornatellina eineta*, Anc.

Quite identical with typical specimens found in a living state on Maui, Oahu, and Hawaii.

28.—*Tornatellina procerula*, Anc.

Large examples. Also from Maui.

29.—*Tornatellina macromphala*, Anc.

Also from Maui.

30.—*Tornatellina extineta*, Anc.

Found at first subfossil in the sandy isthmus between East and West Maui. I received later fresh specimens collected at Kaupakalua, Maui, by Mr. Baldwin.

31.—*Tornatellina oblonga*, Pease.**32.—*Tornatellina compacta*, Sykes. (?)****33.—*Tornatellina fusca*, Anc.**

One or two young specimens of this remarkable species.

34.—*Tornatellina rudicostata*, n. sp.

Pl. v. figs. 20, 21.

Testa oblongo-attenuata, perforata, emortua albida (statu recenti verisimiliter cornea), iris confertis acutis fere rectis, parum regularibus, in ultimo subflexuosis insigniter exarata; spira sat producta, conoidea, obtusula; anfractus 6 convexi, regulariter crescentes, sutura impressa propter plicas crenulata discreti; primi laevigati, ultimus oblongus, parum attenuatus, dorso et versus aperturam sulco mediano concentrico impressus; apertura vix obliqua, subirregulariter truncato-ovalis, in adultis lamina parietali valida excepta inermis; columella incrassatula, arcuata; peristoma acutum, rectum, margine columellari dilatato, expanso.

Obs. Apertura in junioribus, praeter laminam parietalem plicis acutis duabus columellaribus et lamina transversa longa volventi in interiore palati armata.

Long. $2\frac{1}{2}$, diam. $1\frac{1}{4}$; alt. apert. $\frac{3}{4}$ millim.

An extraordinary species, quite unlike anything described in the genus. The general aspect is that of a very small *Lepturhatina henschawi*, but the plicae are coarser and irregular. The sculpture is quite unusual in the genus. No living forms are allied to this.

35.—*Tornatellina cyphostyla*, n. sp.

Pl. v, figs. 22, 23.

Testa conoideo-oblonga, gracilis, laevigata, subfossilis alba, tenuis, nitida, aperte sed minute perforata; spira conica, elongata, lateribus rectis, summo obtuso; anfractus 6 parum convexiusculi, regulariter crescentes, sutura lineari, appressa discreti, ultimus oblongus, subattenuatus; apertura distincte obliqua, truncato-ovalis, lamina unica volventi validiuscula in pariete armata; columella regulariter arcuato-declivis, subincrassata, inermis; peristoma simplex, acutum, rectum, margine extero post insertionem arcuato, columellari expanso, perforationem haud claudente.



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NEW SEMI-FOSSIL HAWAIIAN LAND SHELLS.

Obs. *Columella juniorum* biplicata.

Long. $2\frac{3}{4}$, diam. $1\frac{1}{3}$; alt. apert. 1 millim.

A very distinct species, of regular outline. Its principal characters are the conic spire, barely convex whorls, appressed sutures and oblong aperture not at all widened below and slightly oblique. The columellar margin is gently curved and without plicae except in young specimens, and the parietal lamella is rather strong.

36.—*Succinea*, sp.

Related to *S. cepulla*, but more oblong, and to *S. souleyeti*, Anc., which is, I think, distinct from *cepulla*.

37.—*Succinea*, sp.

Allied to *S. kuhnsi*, Anc., but not quite so oblique.

38.—*Succinea*, sp.

Like the preceding one, but more slender and more pointed spire,

39.—*Succinea inconspicua*, Anc.

40.—*Succinea*, sp.

A single specimen of a peculiar form, next to *S. casta*, Anc. var *henshawii*, Anc., but smaller and more elongate.

41.—*Succinea*, sp.

This groups with *S. tetragona*, Anc., of Maui and *S. quadrata*, Anc., of Oahu, Hawaii. In most specimens there is a well marked angular shoulder on the upper of the last whorl.

Although most of the *Succineae* are probably new species, though in some instances, very near to some of the recent forms, I do not wish to name them, because they will be described and figured by Professor H. W. Henshaw.

EXPLANATION OF PLATE V.

Figs. 9, 10. *Pseudohyalinia meniscus*, n. sp.

Figs. 11, 12. *Punctum horneri*, n. sp.

Figs. 13, 14. *Endodonta laminata*, Pease.

Figs. 15, 16. *Endodonta (Thaumatodon) henshawii*, n. sp.

Fig. 17. *Endodonta hystriella*, Pfr. var. *faucilamellata*, n. var.

Fig. 18. *Lyropufa mirabilis*, Anc. var. *hawaiiensis*, n. var.

Fig. 19. *Lyropufa magdalenae*, Anc. var. *prisca*, n. var.

Figs. 20, 21. *Tornatellina rudicostata*, n. sp.

Figs. 22, 23. *Tornatellina cyphostyla*, n. sp.

CURRENT LITERATURE.

Baker, F. C.—The Molluscan Fauna of the Dells of Winconsin. Trans. Ac. Sc. St. Louis, 1904, vol. xiv, pp. 99—105.

Baker, F. C.—Notes on *Planorbis truncatus* Miles. Ibid., pp. 107—110.

The writer is of opinion, after examining several thousand specimens of *P. irizolvis* and comparing them with examples of *P. truncatus*, that the latter is the ancestral form of the former species, and not *vice versa* as he has previously stated.

Baker, F. C.—The Arrangement of the Collection of Mollusca in the Chicago Academy of Sciences. Museums Journ., 1904, vol. iii, pp. 354—360, pl. xlv.

Girty, George H.—New Molluscan Genera from the Carboniferous. Proc. U.S. Nat. Mus., 1904, vol. xxvii, pp. 721—736, pls. xlv—xlvii.

The new genera and species described and figured are : *Limifecten texanus*, *Pleurophorella papillosa*, *Clavulites howardensis*, and *Schuchertella*, n. nom., "proposed for shells having the type of structure for which the name *Orthothetes* is at present in use." Type *S. lens*, White.

Hedley, C.—The Effect of the Bassian Isthmus upon the existing marine fauna : a study in ancient geography. Proc. Linn. Soc. N.S.W., 1903, pp. 876—883.

Hedley, Charles.—Additions to the Marine Molluscan fauna of New Zealand. Rec. Aust. Mus., 1904, vol. v, pp. 86—97, figs. 14—25.

The new genera and species are : *Pleurodon maorianus*; *Verticoprionus mytilus*, gen. and sp. nov., referred with some doubt to the *Carditidae*; *Schismope brevis* and *S. rosea*; *Incisura*, nov. gen., type *Scissurella lytteltonensis*, Smith; *Puncturcella demissa*, *Liolia polypleura*, *Cacum digitulum*, *Conthonyia corrugata*, *Rissoa suteri*, *Eulima faxillus*, and *Leiostraca murchiei*.

Pecten aviculoides, Smith, is transferred to the genus *Cyclopecten*, *Carditella delta*, Tate and May, to *Cuna*, and *Daphnella substriata*, Suter, to *Mitromorpha*, thus adding three genera and two species new to the New Zealand fauna.

Sykes, E. R.—Description of two new species of *Melania* from the New Hebrides. Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 13, 14, figs. 1, 2.

The two new species are *M. morti* and *M. cingulifera*.

Sykes, E. R.—On the Mollusca procured during the "Porcupine" Expeditions, 1869—1870. Supplemental Notes, Part I. Ibid., pp. 23—40, pl. iii.

This is an exceedingly valuable piece of work, and no one is better qualified to undertake it than Mr. Sykes.

Numerous points in nomenclature are dealt with, two new species are described and figured, viz., *Retusa marshalli* and *Cylichna obscura*, and figures are given of *C. hocrnesi* (Weinkauff), *C. elongata* (Jeffreys), *Acleon globulinus* (Forbes), *Bulla striatula*, (Forbes), *Retusa lactea* (Jeffreys), and *R. excavata* (Jeffreys).

Sykes, E. R.—The Hawaiian species of *Opeas*. Ibid., pp. 112, 113, figs. 1—4.

Figures of *O. junceus* (Gould), *O. pyrgiscus* (Pfr.), and descriptions and figures of *O. henshawii*, n. sp., and *O. prestoni*, n. var. *hawaiiensis*.

Sykes, E. R.—On the Polyplacophora. In Herdman, Report . . . on the Pearl Oyster Fisheries of the Gulf of Manaar. Part I, Suppl. Rep. iv, pp. 177—180, pl. i. London, 4 to, 1903.

The collection includes nine species. Of these, three are identified (one doubtfully) with known forms; one species of *Callochiton*, three of *Ischnochiton*, and one of *Tonicia*, are new.

Sykes, E. R.—Zoological Record, 1903, vol. xl. Div. vii. Mollusca. London: July 1904.

This invaluable work reaches us considerably earlier than in previous years, and although possibly not quite so complete as in former years, it is a great advantage to have the same so promptly.

So far as the general Record is concerned there are no salient alterations, but the cross references are perhaps not so complete as in previous issues.

Pallary, Paul.—Additions a la faune conchyliologique de la Méditerranée. Ann. Mus. d'Hist. Nat. Marseille—Zoologie—1903, T. viii, pp. 5—16, pl. i.

Pallary, Paul.—Quatrième contribution a l'étude de la faune malacologique du Nord-Ouest de l'Afrique. Journ. de Conchyl., 1904, vol. lii, pp. 5—58, pls. i—iii.

In this interesting memoir the author describes and figures a peculiar *Parmacella*-like shell for which the genus *Vaucheria* is established. *V. tingitana*, the type, is known from the shell only, which is dextral and larger than any known form. It is to be hoped that Mr. Pallary will ultimately succeed in finding the living animal.

Many new species of *Helix* are described and figured, as well as new species of *Limnaea*, *Valvata*, and *Melanopsis*.

Hoyle, W. E.—A Diagnostic Key to the Genera of Recent Dibranchiate Cephalopoda.

Mem. and Proc. Manchester Lit. and Phil. Soc., 1904, vol. xlviii, No. 21, pp. 1—20.

What must prove a most useful aid to workers on the recent Dibranchiate Cephalopoda, has been drawn up by Dr. Hoyle in preparation for a systematic account of the recent Cephalopoda to be published in the "Tierreich" of the German Zoological Society and Berlin Academy.

Elliot, C.—On some Nudibranchs from East Africa and Zanzibar. Part III. Proc.

Zool. Soc. Lond., 1904, pp. 354—385, pls. xxxii—xxxiv. Part IV. Ibid., pp. 380—406, pls. xxiii, xxiv.

The author, in these two papers, treats of the Cryptobranchiate Dorids, which are represented by 49 species of which 1 genus and 25 species are new. In examining the value of the chief points by which the sub-families and genera under consideration can be differentiated, it is pointed out that such characters as the rhinophores and branchial and the generative organs are disappointing as a means of classification; while the characters of the dorsal surface and general texture, the foot, and the mouth parts are regarded as forming a fairly good indication of relationship. The internal organs, in the author's opinion do not offer many features which serve for the purpose of classification.

Bartsch, Paul.—A new *Ashmunella* from New Mexico. Smithsonian Miscell. Coll., 1904, vol. 47, pp. 13, 14.

Ashmunella townsendi, n. sp., is most nearly related to *A. rhyssa*, Dall, but is much smaller than that form and is uniformly more strongly sculptured. Loc. Ruidoso, New Mexico.

Hyde, Ada H.—The Nerve Distribution in the Eye of *Pecten irradians*. Mark Annivers. Vol., 1903, pp. 471—482, 1 pl.

Hyde, Ada H.—The Retinal Nerve-ending in the Eye of *Pecten*. Biol. Bull., 1904, vol. 6, p. 317.

- Knight, G. A. F.**—A Visit to the Outer Hebrides in search of Mollusca. *Trans. Perthsh. Soc. Nat. Sci.*, 1903, vol. 3, pp. 193—217, map.
- Stenta, M.**—Zur Kenntniss der Strömungen im Mantelraum der Lamellibranchiaten. *Arb. Zool. Inst. Wien*, 1903, Bd. 14, pp. 211—240, 1 Taf.
- Zugmayer, Erleth.**—Über Sinnesorgane an den Tentakeln des Genus *Cardium*. *Zeit. f. wiss. Zool.*, 1904, Bd. lxxvi, pp. 478—508, Taf. xxix.
- Sassi, M.**—Zur Anatomie von *Anomia ephippium*. *Arb. Zool. Inst. Wien*, Bd. 14, pp. 81—96, 1 Taf.
- Thesing, C.**—Beiträge zur Spermatogenese der Cephalopoden. *Zeit. f. wiss. Zool.*, 1904, Bd. lxxvi, pp. 94—136, Tfn. viii, ix.
- Wettstein, E.**—Zur Anatomie von *Cryptoflax larvaeformis*, Burrow. *Jena. Zeitschr.*, 1903, Bd. xxxviii, pp. 473—504, 3 Taf.
- Rice, E. L.**—Preliminary Report on the Development of the Gill in *Mytilus*. *Ohio. Nat.*, 1904, vol. iv, p. 51.
- Drew, Gilman A.**—The Anatomy and Embryology of *Pecten tenuicostatus*. *Biol. Bull.*, 1904, vol. 6, p. 307.
- Budington, R. A.**—Nervous Regulation of the Heart of *Venus mercenaria*. *Ibid.*, pp. 311, 312.
- Smallwood, W. M.**—Natural History of *Hamina solitaria* Say. *Amer. Nat.*, 1904, vol. 38, pp. 207—225, 10 figs.

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VOL. XI.

DESCRIPTIONS OF SOME NEW SPECIES OF
CINGALESE AND INDIAN MARINE SHELLS.

By H. B. PRESTON, F.Z.S.

(Plates vi and vii.)

The species about to be described formed part of the collection of the late Mr. Hugh Nevill, who was for many years resident in Ceylon, and a portion of whose collection came into my hands upon its dispersal during the early part of the present year. Although exact localities were often not given, all the present species, with one exception, are undoubtedly from Ceylon,

Cythara nevilliana, n. sp.

Pl. vii, figs. 1, 2.

Shell subfusiform, obtuse, solid, uniformly white; whorls 5—6, convex, coarsely ribbed and spirally grooved, giving the shell a cancellated appearance; suture impressed; aperture high and narrow; columella curved, somewhat rough; peristome slightly thickened and bent inwards over the aperture, the edge being serrated by the spiral grooves.

Alt. 5 millim.; diam. maj. 2.5. Aperture, alt. 3 millim.; diam. .5.

Hab.—Ceylon.

Clathurella bullenii, n. sp.

Pl. vii, figs. 3, 4.

Shell ovate, solid, brownish lilac, or ornamented on the last whorl with a broad peripheral yellowish-white band, and on the earlier whorls with a very narrow, but distinct, band of a similar hue; whorls 8, convex, transversely ribbed and spirally grooved, giving the shell a coarsely granulated appearance; suture well impressed; aperture narrow, one third of the height of the whole shell; columella curved; peristome thickened and bent inwards.

Alt. 6 millim.; diam. maj. 3. Aperture, alt. 2 millim.; diam. .5.

Hab.—Ceylon.

***Thala ceylanica*, n. sp.**

Pl. vi, figs. 1, 2.

Shell slender, attenuated; whorls 7—8, sculptured with closely set transverse ridges crossed by finer spiral lines, giving the shell a granulated appearance; colour pink, mottled and streaked with white and pale chestnut, the latter colour developing into a broad peripheral band on the body-whorl; aperture narrow; columella four-plaited; peristome thickened and slightly notched above.

Alt. 10 millim.; diam. maj. 2.5. Aperture, alt. 4 millim.; diam. maj. .5.

Hab.—Ceylon.

***Nassa (Phrontis) siva*, n. sp.**

Pl. vi, figs. 3, 4.

Shell ovately conic, spirally striated, especially on the apical whorls and lower portion of the body-whorl, and coarsely ribbed throughout except on the last half of the body-whorl, where the lower portion of the ribs becomes obsolete; whorls 8—9, somewhat convex, pale brownish-yellow, ornamented with two chestnut bands; suture impressed; columella distinctly plaited, expanded and extending above into a callosity bearing a single plait near the junction of the peristome with the whorl above; peristome thickened and slightly reflexed, having five denticles just inside the aperture, the uppermost being more strongly developed than the others; aperture obliquely ovate; canal short and rather broad.

Alt. 12.5 millim.; diam. maj. 6.5. Aperture, alt. 6 millim.; diam. maj. 2.

Hab.—Ceylon.

***Nassa (Phrontis) gangetica*, n. sp.**

Pl. vi, figs. 5, 6.

Shell fusiform, spirally striate (at the base only) and coarsely ribbed except on the last half of the body-whorl, where the surface becomes quite smooth bearing only a row of tubercles just below the suture; whorls 8, fawn colour; suture impressed; columella extending into a callosity reaching to the junction of the peristome with the whorl above and bearing a plait in this region; peristome thickened, slightly reflexed having two obsolete plaits on the inner surface; aperture ovate; canal short; operculum horny, unguiform, with an apical nucleus.

Alt. 10.5 millim.; diam. maj. 4.5. Aperture, alt. 3 millim.; diam. maj. 1.

Hab.—Calcutta.

***Murex (Ocenebra) sykesi*, n. sp.**

Pl. vi, figs. 7, 8.

Shell ovate, solid, five varicose, coarsely ribbed and cancellated on the varices, whorls 6—7; aperture oval; peristome produced; canal only

slightly recurved ; the shell is of a pinkish-white colour, having a brown band just below the periphery ; in many specimens the region of the canal is tinged with rose pink, but this character does not appear to be always constant.

Alt. 20 millim. ; diam. maj. 13. Aperture, alt. 5 millim. ; diam. maj. 3.

Hab.—Ceylon.

This species appears to be most nearly allied to *Murex* (*Ocinebra*) *nucula*, Reeve, from the Philippines, but differs in being much more oval in general shape and the canal being less recurved than is the case in that species ; moreover it has only five varices on the body-whorl whereas in *M. nucula* there are six.

***Coralliophila dissimulans*, n. sp.**

Pl. vii, figs. 5, 6.

Shell conical, exteriorly white ; whorls 5—6, obliquely ribbed, the ribs in places being raised into tubercles ; suture impressed ; aperture ovate ; columella somewhat curved, tinged with pinkish purple ; canal short and curved ; peristome thin, erect ; interior of shell painted with a chestnut coloured band below the periphery and ending abruptly about two millimetres from the edge of the peristome.

Alt. 9 millim. ; diam. maj. 6.5. Aperture, alt. 4.5 millim. ; diam. 1.5.

Hab.—Ceylon.

***Mucronalla birtsi*, n. sp.**

Pl. vii, figs. 7, 8.

Shell fusiform, rather attenuated, smooth, polished, semi-transparent white ; whorls 9, convex, the apex strongly mucronated ; suture slightly channelled ; aperture inversely auriform ; columella twisted ; peristome simple.

Alt. 12.5 millim. ; diam. maj. 5. Aperture, alt. 4 millim. ; diam. 2.

Hab.—Ceylon.

This species appears to be somewhat closely allied to *M. philippinarum*, Sby., but is easily distinguished from that species by its more elongate form, the more transparent texture of the shell, and by the presence of the channelled suture which is not noticeable in *M. philippinarum*.

***Styloptygma lacteola*, n. sp.**

Pl. vi, figs. 9, 10.

Shell attenuate, fusiform, polished, striated with lines of growth, transparent white, encircled with an opaque milky-white band below the suture ; whorls 9—10, slightly convex, and flattened above, giving the impressed suture an almost channelled appearance ; columella arched ; aperture obliquely ovate ; peristome simple.

Alt. 9 millim. ; diam. maj. 2. Aperture, alt. 2 millim. ; diam. maj. 1.

Hab.—Galle, Ceylon.

The apical whorls in many of the specimens examined are tinged with bright pink, but as this is not apparent in all, it is probably caused by the presence of decaying portions of the animal showing through the somewhat transparent shell.

***Maetra delicatula*, n. sp.**

Pl. vi, fig. 11.

Shell triangular, rather oblique, thin, equilateral, somewhat flattened, greyish-white tinged with purple deepening towards the umbonal region, striated with lines of growth, these being rather irregular anteriorly; anterior side rounded into a sharp keel; posterior end flattened, sculptured with fine striae giving a silky appearance, and produced to an obtuse angle.

Alt. 21.5 millim.; length 25.

Hab.—Ceylon

***M. delicatula* var. *nivea*, n. var.**

Pl. vi, fig. 12.

Shell rather smaller, somewhat more lightly striate, pure white except for a very slight tinge of purple on the umbones.

Alt. 17 millim.; length 20.5.

Hab.—Ceylon.

***Maetra taprobanensis*, n. sp.**

Pl. vii, fig. 9.

Shell, ovate, convex, smooth, white painted with pale brown rays of irregular breadth; umbones brownish purple, small; anterior end produced, rounded, posterior end obtusely angled; interior sometimes pale brownish purple, sometimes white tinged with pale brown.

Alt. 7.5 millim.; length 10.5.

Hab.—Ceylon.

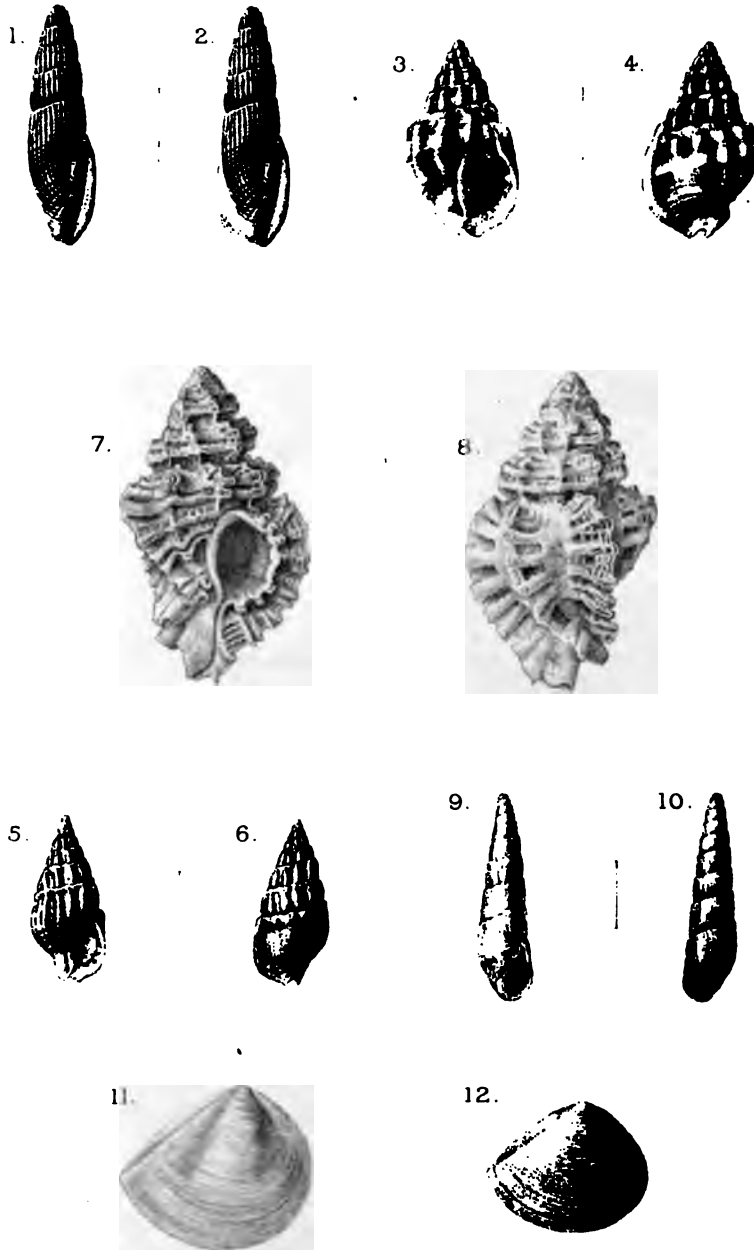
EXPLANATION OF PLATES.

Plate vi.

- | | |
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| Figs. 1, 2. <i>Thala ceylanica</i> , n. sp. | Figs. 9, 10. <i>Styloptygma lacteola</i> , n. sp. |
| Figs. 3, 4. <i>Nassa (Phrontis) siva</i> , n. sp. | Fig. 11. <i>Maetra delicatula</i> , n. sp. |
| Figs. 5, 6. <i>Nassa (Phrontis) gangetica</i> ,
n. sp. | Fig. 12. <i>Maetra delicatula</i> var.
<i>nivea</i> , n. var. |
| Figs. 7, 8. <i>Murex (Ocinebra) sykesi</i> ,
n. sp. | |

Plate vii.

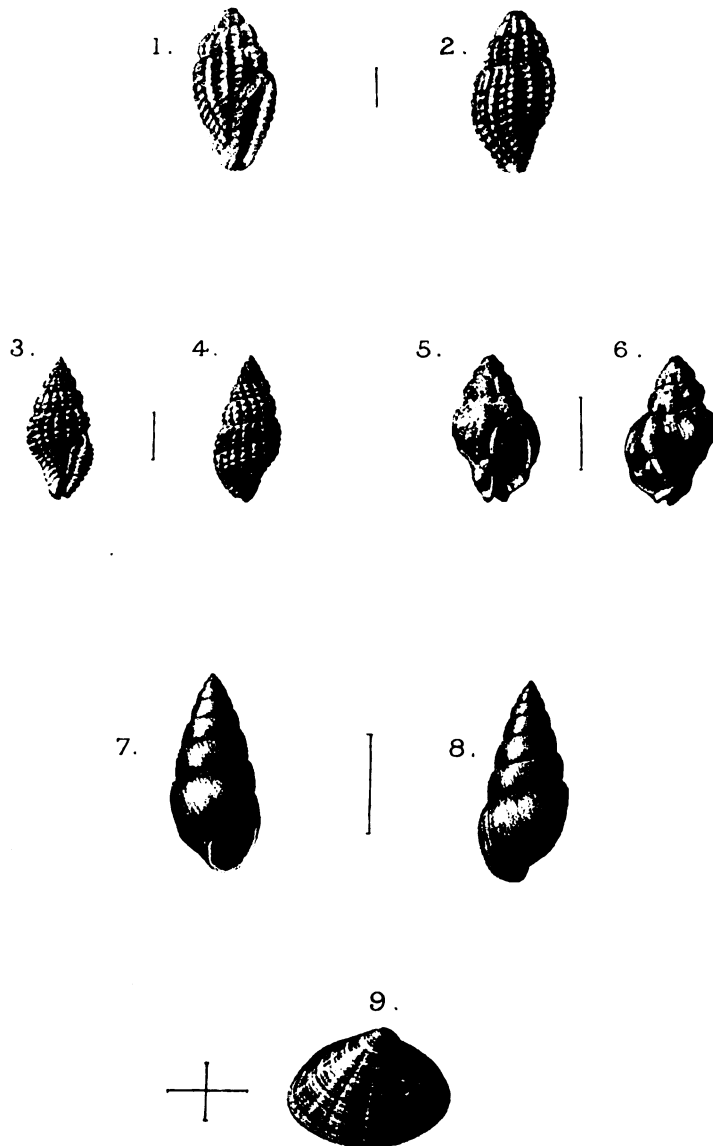
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| Figs. 1, 2. <i>Cythara nevilliana</i> , n. sp. | Figs. 7, 8. <i>Mucronalia birtsi</i> , n. sp. |
| Figs. 3, 4. <i>Clathurella bulleni</i> , n. sp. | Fig. 9. <i>Maetra taprobanensis</i> , n. sp. |
| Figs. 5, 6. <i>Coralliophila dissimulans</i> ,
n. sp. | |



A.H. Searle, del. et lith.

A.S. Huth, imp.

NEW INDIAN AND CINGALESE MARINE SHELLS.



A.H. Searle del et lith.

A.S. Huth, imp

NEW INDIAN AND CINGALESE MARINE SHELLS.



DESCRIPTIONS OF TWELVE NEW SPECIES AND ONE
VARIETY OF MARINE GASTROPODA FROM THE
PERSIAN GULF, GULF OF OMAN, AND ARABIAN SEA,
COLLECTED BY MR. F. W. TOWNSEND, 1902-1904.

BY JAMES COSMO MELVILL, M.A., F.L.S.

(Plate viii.)

I venture to offer another short instalment of descriptions of Gastropoda from the Persian Gulf and contiguous seas, all dredged by Mr. F. W. Townsend, during the past three years (1902-1904).

His last consignments come principally from Dabai, in the Persian Gulf proper, a locality that proved extremely rich, especially in Pelecypoda, though most of the Mollusca obtained had already been catalogued as found elsewhere in the neighbourhood.

But the majority of the following, it will be noted, come from the one almost inexhaustible station already descanted upon in previous papers.⁽¹⁾ This material (excepting as far as the Scaphopoda and Pelecypoda are concerned) is now thoroughly worked out, and it is hoped that a list may be eventually drawn up of all the many forms found in it, as the results are believed to have been rarely, if ever, eclipsed by any previous single haul of the dredge.

Aelis thesauraria,⁽²⁾ n. sp.

Pl. viii, fig. 1.

A testa minutissima, obtecte umbilicata, ovato-fusiformi, delicata, alba, anfractibus 9, quorum $3\frac{1}{2}$ apicales, caudati, omnino laeves, pervitrei, nitentes, caeteris apud suturas impressis, spiraliter acuticarinatis, ultimo et penultimo quatuor, antepenultimo, tribus carinis praeditis, interstitis laevibus, superficie haud nitente, apertura rotunda, peristomate paullum expanso, incrassato, super umbilicum et apud basim columellarem squarrosé effuso.

Long. 2.50, lat. 1 millim.

Hab.—Gulf of Oman, lat. $24^{\circ} 58' N.$, long $56^{\circ} 54' E.$, 156 fathoms.

Very small, but wonderful in its perfection of form and sculpture. The apical whorls are almost caudate, three to four of almost uniform narrow build, quite smooth and glossy, the remainder being uniformly acutely keeled. The thickened peristome with a squarish extension of the columellar base half hides the narrow umbilicus.

In sculpture it shows kinship with *A. avaria*.

1. Ann. & Mag. N. H., 1903, ser. vii, vol. 12, p. 289; Proc. Mal. Soc., vi, p. 51; *ibid.*, p. 159.

2. *Thesaurarius*, treasured.

Rissoina (Phosinella) phormis,³¹ n. sp.

Pl. viii, fig. 2.

R. testa parva, ovato-oblonga, alba, solidula, anfractibus 6—7, quorum apicales 2, vitrei, perlaeves, caeteris apud suturas impressis, undique dense clathratulis, interstitiis squarrosis, apertura oblique ovata, peristomate incrassato extus aspero, intus laevigato, columella obliqua, simplice.

Long. 3.50, lat. 1.50 millim.

Hab.—Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms.

But few examples of a small cancellately whorled *Rissoina*, smaller than any species of the subgenus *Phosinella* that occur in the same seas. All seem dead shells, but in all probability the shell would be colourless in life.

Ethalia carneolata, Melv.var. **rubrostrigata**, nov.

Pl. viii, fig. 3.

E. testa cum forma typica convenit, sed omnino laevigata, nitida, perobscure anfractum apud ultimum bivittata, undique longitudinaliter rubris flammis et lineis pulcherrima ornata.

Hab.—Dabai, Persian Gulf.

A very few specimens dredged in 1904 at the above locality, differing mainly in painting from the original type of this species, but so remarkable and conspicuous is this form, that it is considered worthy of being specially singled out under a varietal name. For description of *E. carneolata*, vide Mem. and Proc. Manch. Soc., No. 7, p. 19, pl. vii, figs. 25, 26.

Omphalius collingel, n. sp.

Pl. viii, fig. 4.

O. testa crassa, mediocri, conica, nigrobrunnea, anguste et profunde umbilicata, anfractibus 6, quorum apicales 1½ laeves, informes, vitrei, caeteris spiraliter granocostatis, costis ad regionem anfractuum superiorem juxta suturas duabus praecipue majoribus nodulorum ordinibus decoratis, nodulis nitidis, rotundis, laevibus, infra, antepenultimo et penultimo binis, ultimo tribus gemmarum ordinibus usque ad peripheriam praeditis, carina peripheriali crassa, ordine noduloso duplicato, regione basali. circa umbilicum sex ordinibus nodulorum parvis, symmetricis, aequidistantibus, apertura trapezoide intus margaritacea, labro angulato, area columellari infra umbilicum bi vel tricalloso, callo albo, nitente.

Alt. 15, diam. 16 millim.

Remarkable in its resemblance to certain South American *Omphalii*, e.g. *O. 4-carinatus* and *4-costatus*, Wood, of which it is the Eastern exponent. It may be distinguished by its blackish-brown colour, thickened substance, and neat concatenation of variously sized rows of spiral noded gemmae, the

³¹ Πομπός, a basket.

larger rows just below the sutures, and towards the centre of the whorls, and likewise very much expressed in thickness with doubled rows of nodules, at the periphery on the last whorl. At the base, concentrically around the umbilicus are spirally ranged six uniform rows of small nodules.

I venture to dedicate this species to Mr. W. E. Collinge, as a very slight mark of esteem and appreciation of his unwearied labours in the cause of Malacology.

Since describing the above, another specimen has come to hand, from a second station in the Persian Gulf, through the medium of Miss M. Lebour.

***Turritella illustris*, n. sp.**

Pl. viii, fig. 5.

T. testa gracili, attenuata, delicata, alba, violaceotincta, vel pallidissime brunnea longitudinaliter indistinctis flammis decorata, anfractibus 17, quorum apicalis parvus, laevis, caeteris apud suturas multum impressis, spiraliter acuticarinatis et tornatis, carinis irregularibus, majoribus cum minoribus alternantibus, anfractus apud supernos 5, tribus ultimis 7, praeditis, apertura ovato-trapezoide, labro tenui, paulum ad basim effuso, columella paulum incrassata.

Long. 2.25, lat. .55 unc.

Hab.—Dabai, Persian Gulf.

An elegant species, its nearest congeners being firstly *T. flammulata*, Kienner, from West Africa, which it resembles in its spiral ornamentation, and likewise, to some degree, in the pale flame-like blotches on, especially the upper, whorls: this is however, a more delicately moulded shell. And also to *T. fultoni*, Melv., also from the Persian Gulf, it bears a close resemblance, but differs in the more irregular carinations, pale colouration, and the spiral blotches, from its congener, which is always unicolorous white.

To Mr. Edgar Smith I am indebted for pointing out the salient characteristics of this species.

***Eulimella aenea*,⁽⁴⁾ n. sp.**

Pl. viii, fig. 8.

E. testa gracillima, attenuata, irregulari, alba, laevi, parum nitida, anfractibus ad 8, quorum apicalis ipse externe revolutus et inversus, huic proximo paulum abnormi et irregulari, caeteris laevibus, ad suturas rotunde impressis, apertura oblonga, labro ad basim paulum effuso, columella fere recta.

Long. 4, lat. 1.50 millim., sp. maj.

„ 2, „ 1 „ sp. min.

An abnormally whorled and formed shell, most akin, so far as the inhabitants of the Persian Gulf are concerned, to *E. gedrosica*, Melv., but the revolute apical whorl is more strongly developed, and the surface perfectly smooth throughout, with no sign of spiral striation. The smallest example before me has the mouth in the greater state of perfection, this exhibiting the normal Eulimelloid character.

4. *Aeneus*, magical or abnormal.

Odostomia dorlea,⁽⁵⁾ n. sp.

Pl. viii, fig. 9.

O. testa ovato-fusiformi. solidula, crassa, alba, anfractibus 7, quorum apicales 2 heterostrophii, vitrei, excavati, laeves, caeteris apud suturas canaliculatis, gradatis, duobus supernis longitudinaliter undique multicostulatis, costulis arctis, tribus ultimis laevibus, apertura fere rotunda, intus spiraliter striata, labro ad basim crassiore, plica columellari forti.

Long. 4, lat 2 millim.

Hab.—Persian Gulf, Maskat, 15 fathoms.

A solid incrassate species, somewhat rude in build, columella very strongly once plaited, whorls very excavate at the sutures, scalate, the apex glassy and heterostrophe. while the two or three next uppermost whorls exhibit longitudinal riblets, the remaining whorls being quite smooth.

Oscilla faceta, n. sp.

Pl. viii, fig. 10.

O. testa pergracili, angusta, alba, delicata, anfractibus 8—9, quorum 2 apicales, heterostrophii, vitrei, laeves, caeteris arcte spiraliter acuticarinatis et et tornatis, carinis duabus apud supernos, tribus apud antepenultimum et penultimum, ultimo anfractu ad sex carinas, superficie interstitiali laevigata vel obscure sub lente alveata, apertura ovato-oblonga, labro tenui, columella fortiter uniplicata.

Long. 3 50. lat. 1.50 millim., sp. max.

" 3 " 1 " sp. min.

Hab.—Gulf of Oman. Lat. 24° 58' N, long. 56° 54' E., 156 fathoms.

At first deemed an attenuate variety of *O. indica*, Melv.,⁽⁶⁾ a not infrequent species in these seas, this proposed new form differs in its far more graceful and uniformly narrowed contour, more oval aperture, and stronger columellar plica. Were it not for the presence of this last feature, indeed, it might be considered a *Cingulina*, near *C. isseli*, Tryon, which is very abundant in many parts of the North Arabian Sea. *Iraucalia trochlearis*, Gould, a Rissoid, likewise has a strange superficial resemblance to this alliance of *Pyramidellidae* in these seas, as we have already mentioned.⁽⁷⁾

Oscilla jocosa, n. sp.

Pl. viii, fig. 11.

O. testa minuta, ovato-conica, alba, anfractibus 5—6, quorum 2 apicales heterostrophii, vitrei, in proportionem magni, caeteris tri-, ultimo anfractu sex vel septem carinulatis, carinis paullum obtusis, superficie interstitiali sub lente

5. *Doricus*, from its severely classic build.

6. Proc. Mal. Soc. Lond., vol. ii, p. 112, pl. viii, f. 5.

7. Proc. Zool. Soc., 1901, pt. II, p. 369.

lepidè alveata, ultimo ad peripheriam subangulato, apertura ovato-rotunda, labro tenui, angulata, columella uniplicata.

Long. 2, lat. .75 millim.

Hab.—Gulf of Oman. Lat. 24° 58' N., long. 56° 54' E., 156 fathoms.

The smallest by far of the four *Oscillae* yet detected as occurring in this region, and of which very few specimens have come to light. It appears mature, the angle at the periphery alone will distinguish it from its congeners.

***Mumiola carbacea*,⁽⁸⁾ n. sp.**

Pl. viii, fig. 12.

M. testa ovato-oblonga, parum perforata, delicata, albo-lactea, papyracea, anfractibus 6, quorum 1½ apicales, globulosi, vitrei perlaeves, apice ipso depresso, caeteris gradatulis, undique tenui costatis, costis fere rectis, interstitiis arctissime spiraliter liris, costis ultimum apud anfractum numero circiter 18, interdum ad basim fere evanidis, apertura ovata, labro tenui, columella simplice, paullum incrassata.

Long. 3, lat. 1.30 millim.

Allied to *M. spirata*, Ad., found also in the Arabian Sea; but its gradate whorls, depressed globular apex, delicate ribs, and oval mouth with simple unplaited columella, differentiate this species from its congeners.

***Eulima (Subularia) hypolysina*, n. sp.**

Pl. viii, fig. 13.

E. testa vitrea, aciculata, per-attenuata, delicatissima, anfractibus 8—9, undique albo-hyalinis, laevissimis, politis, ad suturas impressis, tumidulis, lateribus infra fere rectis, ultimo interdum obscure spiraliter rufozonulato, paullum producto, apertura anguste oblonga, labro superne, juxta suturas, sinuato.

Long. 3.50, lat. 1 millim.

Hab.—Gulf of Oman. Lat. 24° 58' N., long. 56° 54' E., 156 fathoms.

This narrow, hyaline little species, of extreme fragility and delicacy, is, as pointed out to me first by Mr. E. R. Sykes, chiefly remarkable for the rounding off, and consequent sinuate appearance of the thin, flexuous and slightly effuse outer lip, as it approaches the suture. In this respect, though not to so great an extent, it assimilates the terrestrial *Hypolysia florentiae*, M. and P., from Natal, a genus allied to *Opeas*, and the specific name is proposed from that circumstance. *E. (Subularia) birittata*, H. & A. Ad., occurring most plentifully with it, at no stage of its existence presents the same characteristics.

8. *Cabesus*, white sail-cloth, from the papyraceous texture.

Mangilia posidonia,⁽⁹⁾ n. sp.

Pl. viii, fig. 14.

M. testa minuta, breviter fusiformi, solidiuscula, alba, angulifera, anfractibus 8, quorum $2\frac{1}{2}$ inconspicui, vitrei, laeves, apicales, caeteris apud suturas multum impressis, longitudinaliter paucicostatis, costis crassis, undique spiraliter angulato-liratis, ultimo anfractu octo liris praedito, penultimo. simul ac antepenultimo tribus, apertura anguste oblonga, labro incrassato sinu indistincto sed lato, haud profundo, columella simplice.

Long. 5, lat. 2 millim.

Hab.—Gulf of Oman. Lat. $24^{\circ} 58' N.$, long. $56^{\circ} 54' E.$, 156 fathoms.

A not infrequent species in dredged shell sand from the above locality, its nearest congener being *M. adamantina*, Melv.,⁽¹⁰⁾ a more squarely formed *Mangilia*, with distinctly larger, globular, vitreous apical whorls.

Daphnella eulimenes,⁽¹¹⁾ n. sp.

Pl. viii, fig. 15.

D. testa parva, eleganter fusiformi, alba, delicata, anfractibus 7—8, quorum apicales decussatuli, caeteris leniter supra versus suturas angulatis, arcte sed irregulariter cancellatis interstitiis plus minus quadratulis, apertura oblonga, labro incrassato, sinu patulo sed nequaquam profundo, columella fere recta paullum apud basim producto.

Long. 6, lat. 2 millim.

Hab.—Gulf of Oman. Lat. $24^{\circ} 58' N.$, long. $56^{\circ} 58' E.$, 156 fathoms.

Of the same alliance as *D. nereidum* and *D. amphitrites*, M. & S., but more gracefully formed, and gently slopingly angled below the sutures. Very rare at the above locality.

* * * * *

An opportunity is here taken of figuring two species from the Persian Gulf region, viz.,

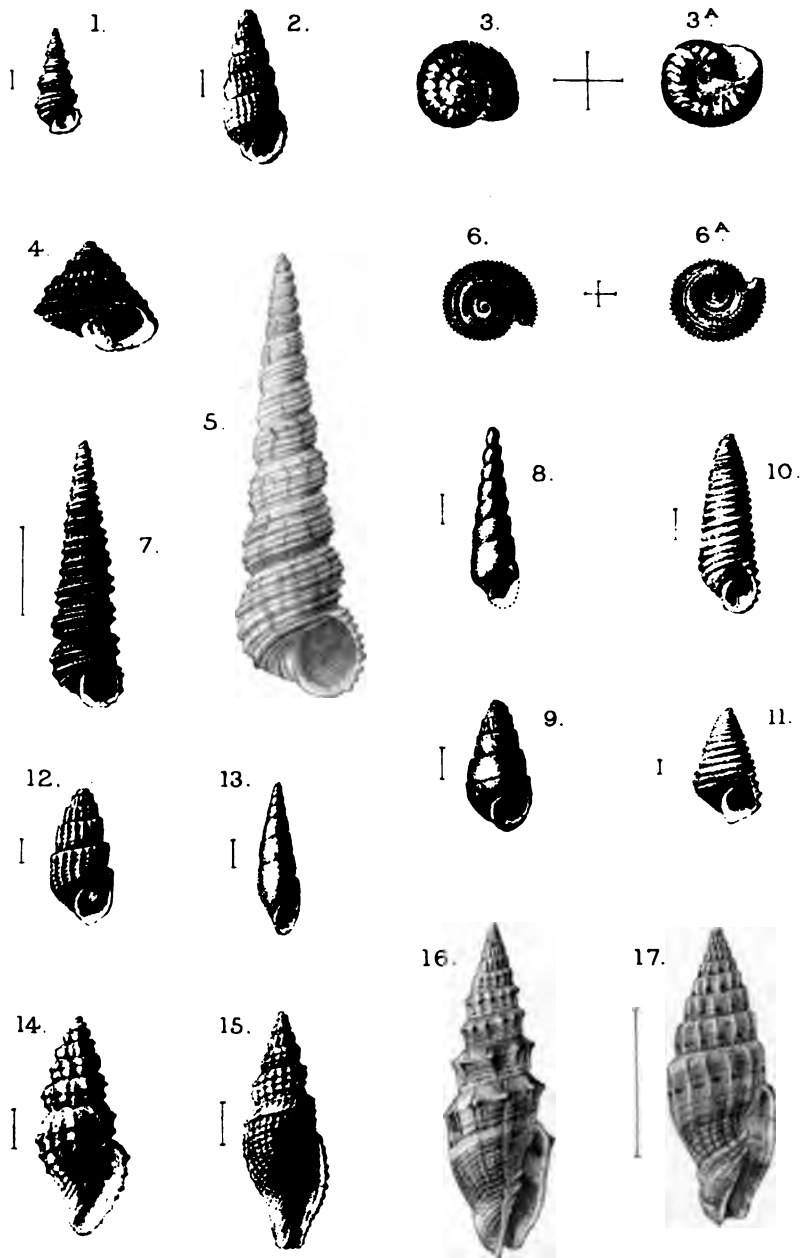
Mathilda carystia (Fig. 7.).**Solarium admirandum** (Fig. 6).

Both were described in Ann and Mag. N. H., ser. vii, pp. 221—223, but owing to exigencies of space, have been, till now, left unportrayed.

9. *Poseidon*, Neptune.

10. Proc. Mal. Soc., vol. vi, pt. III, p. 165, pl. x, fig. 18.

11. Εὐλιμένη—a Nereid.



A.H. Searle, del. et lith.

A.S. Huth, imp.

NEW GASTROPODA FROM THE PERSIAN GULF.

EXPLANATION OF PLATE VIII.

- Fig. 1. *Adis thesauraria*, n. sp.
 Fig. 2. *Rissoina phormis*, n. sp.
 Fig. 3. *Ethalia carneolata*, Melv. var. *rubrostrigata*, n. var.
 Fig. 4. *Omphalius collingei*, n. sp.
 Fig. 5. *Turritella illustris*, n. sp.
 Fig. 6. *Solarium (Torinia) admirandum*, M. & S.
 Fig. 7. *Mathilda carystia*, M. & S.
 Fig. 8. *Eulimella acaea*, n. sp.
 Fig. 9. *Odostomia dorica*, n. sp.
 Fig. 10. *Oscilla faceta*, n. sp.
 Fig. 11. *Oscilla jocosa*, n. sp.
 Fig. 12. *Mumiola carbacea*, n. sp.
 Fig. 13. *Eulima (Subularia) hypolysina*, n. sp.
 Fig. 14. *Mangilia posidonia*, n. sp.
 Fig. 15. *Daphnella culimenes*, n. sp.
 Fig. 16. *Mitra (Callithea) stephanucha*, Melv.
 Fig. 17. " " " var. *astephana*, n. var.

NOTE ON MITRA STEPHANUCHA, MELV., WITH DESCRIPTION OF A PROPOSED NEW VARIETY.

BY JAMES COSMO MELVILL, M.A., F.L.S.

(Plate viii, figs. 16, 17.)

SINCE December 1896, when the first examples of this fine mollusc were described, it has been frequently dredged, and is now fairly generally to be found in collections.

The largest specimen we have seen, now figured, came from the neighbourhood of Muscat, in 1901 (this being the original and central habitat for the species), and measures longitudinally 45 as against 42 millimetres in the type. This individual is of a warm and cinereous-brown. The whorls are at least 15 in number, the actual apex not being quite perfect, while the spiral row of strong echinulate coronals in the upper part of the longitudinal ribs is extremely well developed. Below these, only traces of the usual transverse interrupted dark line, so conspicuous as a rule, exist, and this is followed by a plain grey and somewhat indistinct spiral band.

As a contrast to this, a remarkable form has been quite recently dredged in the locality given below, and as it possesses so many points of similarity to *M. stephanucha* it is the wisest course to deem it a marked variety, at all events till more specimens come to hand.

I therefore characterise it thus:

Mitra (Costellaria) stephanucha, Melv.

var. **astephana**,⁽¹²⁾ nov.

Shell in general form and coloration as in the type, but much smaller, 11—12 whorled, perhaps not quite full grown, the 2½ apical, glassy pale brown, the rest longitudinally ribbed, ribs shining, smooth, number on the body whorl 13 as against 10—11 in the normal form, when mature, upper whorls interstitially spirally punctately sulcate, less deeply, but still conspicuously on the lower whorls, there being a grey central zone at the centre of the basal, as in the type, with interrupted spiral dark line, between the ribs on the five last whorls. The echinate and acutely-noduled coronal, on the other hand, round the upper portion of the ribs is well nigh or quite obsolete, giving a perfectly different character to the facies of this new variety, proposed from this circumstance, to be called *astephana*. Indeed, it seems comparable with such a species as *M. (Costellaria) nodilyrata*, A. Ad. from the Philippines. I would add, that Messrs. Sowerby & Fulton, in their last issued elaborate catalogue of Mollusca (April, 1903, p. 18) classify *M. stephanucha* as a *Callithea*, in which subgenus *M. stigmataria* and *sanguisuga* are placed. The variety just described certainly bears a relationship to these latter, and we are not sure that *Callithea* does not therefore suit the species better than *Costellaria*: but the two sub-divisions run very closely together, and are not well defined.

Long 20, lat. 6.50 millin.

Hab.—Gulf of Oman. Lat 26° 6' N., long. 56° 53' E., 15 fathoms.

12. 'Λδρέφάνος, without a coronal.

ON SOME NON-MARINE SHELLS FROM THE AUSTRO- AND INDO-MALAYAN REGIONS.

By E. R. SYKES, B.A., F.L.S.

(Plate ix.)

THE forms dealt with in the following paper have come to me from several sources, mainly however, from Herr Fruhstorfer.

Thanks to the kindness of Mr. Edgar Smith, to whom I owe many thanks for his unfailing help, I have also had the advantage of seeing a series in the possession of the British Museum.

All the actual "types" are in my own collection.

***Trochomorpha guillemi*, n. sp.**

Pl. ix, figs. 11, 12.

Shell widely and openly umbilicate, depressed conoid, thin, horn colour; sculpture well-marked lines of growth, cut, on the lower surface, by numerous, close-set, microscopic spirals; suture well-marked; whorls $6\frac{1}{2}$, regularly increasing, plano-convex, the last whorl not descending, with an acutely angled periphery, base moderately inflated; mouth subquadrate, lip thin but slightly incrassated on the columellar margin.

Diam. max. 35; alt. (from apex to base of last whorl in front) 8; diam. max. of mouth 15 millim.

Hab — Engano.

***Trochomorpha dautzenbergi*, n. sp.**

Pl. ix, figs. 13, 14.

Shell moderately and openly umbilicate, subdepressed conoid, rather thin, chestnut-brown; sculpture lines of growth, obscurely marked on the base by traces of microscopic spirals; whorls $6\frac{1}{2}$, regularly increasing, flattened, the last whorl not descending and a trifle concave just above the very acute angled periphery, base flattened but a little inflated; mouth subquadrate, lip thin but slightly incrassated on the columellar margin.

Diam. max. 31; alt. (from apex to base of last whorl in front) 7.8; diam. max. of mouth 13 millim.

Hab. — Engano.

These two handsome forms may be separated by the following characters. In *T. guillemi* the shell is larger, lighter in colour, more depressed, and the whorls are slightly more swollen, and there is an absence of the concavity just above the periphery on the last whorl. The spiral sculpture on the base is also more marked, and the base itself is a little more swollen. I have adopted the names given to them in MS. by Herr Fruhstorfer.

Albersia waigiouensis, n. sp.

Pl. ix, fig. 16.

The shell now under consideration appears to be widely distributed in collections under the name of *A. granulata*, Q. & G., and perhaps the most serviceable method will be to diagnose it by comparison with that species.

Shell differing from *A. granulata* in the following respects: shell more depressed in proportion to the width; colour a little darker and a white zone is present below the dark encircling band, with indications of another zone above; sculpture consisting of a very large number of minute spirals which, cutting the lines of growth produce the effect of microscopic granulation, this marking gradually fades out towards the apex, which is almost smooth; contrasted with *A. granulata* the shell differs in the presence of the dense spirals and the absence of the coarse granulation on the last whorl; the mouth in the present species is twisted at the columellar junction and has an obsolete tubercle.

Diam. max. 47 millim.

The habitat is Waigiou, and I believe all the records of *A. granulata* from the Island belong to the present species, and not to the true *A. granulata* whose habitat is Port Dorey, New Guinea.

Planispira (Vulnus, n. sect.) endoptycha, Martens.var. **depressa**, n. var.

Shell somewhat more flattened.

Hab —Waigiou.

This species was described by von Martens as a *Helix* from Batjan, Mareh, and Ternate; I have a typical specimen said to have come from Obi, and a more depressed form from Waigiou. Whether the *Dorrasia compta* of Henry Adams really belongs here, as has been suggested, it is hard to say; the type does not appear to be in the British Museum. The species is placed by Mr. Pilsbry under the genus *Planispira* in a separate group with *P. porcellana*, Grateloup. *P. endoptycha* appears to me to be well worthy of a separate sectional name, being characterised by a thin deciduous periostracum, and the remarkable indentations on the last whorl at the periphery and also on the base, but, apart from these characters resembling *Cristigibba*. To this group *P. porcellana*, and *Helix infracta*, Mrtns., probably also belong. *Vulnus* also recalls the Costa Rican *Acerellia macneili*, Crosse.

Planispira (Cristigibba) gebiensis, n. sp.

Pl. ix, figs. 7, 8.

Shell moderately umbilicate, large, almost flat, slightly gibbous, crest behind the lip small, closely covered with a hairy periostracum, lines of growth obscure: whorls 5 (?), the apex broken; colour in general dark-brown on the last whorl, becoming lighter on the earlier whorls, with two white zones just

above the periphery, the lower being the broader, and a third white zone at the suture, noticeable for a whorl and a half from the mouth; mouth broadly ovate, large, lip well expanded, and slightly reflected on the outer margin, more noticeably so on the columellar margin and at the base, the external colouring of the shell is seen inside the mouth, and the colouring is produced to the edge of the lip.

Diam. max. 30; alt. (to base of lip) 12 millim.

Var. *a*. Similar to type, but the crest stronger, the colour a pale straw yellow with a white zone just above the periphery and narrower brown zone just below, with indications of another white zone just above this and at the suture; periostracum a little more noticeable.

Diam. max. 28; alt. (to base of lip) 12 millim.

Hab.—Gebi Island.

***Planispira (Cristigibba) fruhstorferi*, n. sp.**

Pl. ix, figs. 9, 10.

Shell almost flat, horn-brown, openly umbilicated; sculpture well-marked lines of growth and a number of closely-set, small, pits, resembling the hair-scar markings seen on species of *Allersia*, and showing that when alive the shell is clothed with a deciduous hairy periostracum; whorls $4\frac{1}{2}$ —5. convex, and separated by a deep suture, the last whorl is swollen and has a well-marked crest behind the outer lip; mouth descending above, ovate, with a darker brown marking just inside, lip whitish-horn colour, lightly incrassate and subreflexed, a very thin callus joining the margins.

Diam. max 13.8; alt 6.5 millim

Hab—Obi.

A small form, whose most striking characters are its uniform brown colour and its sculpture.

***Obba subgranulata*, n. sp.**

Pl. ix, figs. 5, 6.

Shell perspectively umbilicated, depressed, with a very acute peripheral keel; pale brown, with two chestnut bands above the periphery and two below; those nearest the periphery being by far the wider; protoconch light chestnut; smooth, save for radiating lines, the residue of the shell minutely irregularly granulate, with a few scattered hairs on the last whorl, and some wrinkles behind the lip; whorls $4\frac{1}{2}$ —5. flattened, the last whorl much descending at the mouth and somewhat compressed; aperture very oblique, outer margin acutely angled, lip moderately thick, expanded, reflected, white, with a fairly thick callus joining the margins.

Alt. 10; diam. max. 27 millim.

Hab.—Batjan.

Recalling *O. marginata*, Müll., but differing in the sculpture, compression of the last whorl, shape of the spire, etc. From *O. koleltiana*, Pfr., which it appears to resemble in sculpture, the general shape, descending last whorl, etc., should suffice to distinguish the present shell. I have seen two specimens, agreeing entirely except in size. It is always difficult to say whether a sculpture of the nature of that found on the present shell is formed by close-set pits or real granules.

***Papuina ecolorata*, n. sp.**

Pl. ix, fig. 2.

Shell trochiform, umbilicate, thin, transparent, white faintly tinged with pale yellow, protoconch large, polished, smooth, the residue of the shell lightly marked by growth lines and, very obscurely, subgranulose; whorls $5\frac{1}{2}$ —6, the earlier ones somewhat convex, the later flattened, the last whorl strongly keeled at the periphery, flattened on the base, and somewhat compressed behind the mouth; aperture very slightly descending, subquadrate, white within, the lip at the upper edge of the outer margin is not reflected, but gradually becomes so towards the base, and the columellar margin is incrassated, well expanded and reflected over the umbilicus, half concealing it.

Alt. (to base of lip) 16; diam. max. 28 millim.

Hab.—Batjan.

Though this shell has no striking peculiarities still, as I have been unable to attach it to any form known to me, I have given it a name. Its only salient characters are the thin shell and entire absence of any colour pattern.

***Papuina semibrunnea*, n. sp.**

Pl. ix, fig. 1.

Shell umbilicate, orbicular-conoid, apex somewhat acute, fairly solid, with a thin deciduous periostracum, lines of growth moderately distinct, traces of microscopic granulation are seen, chiefly on the base; apex chestnut-brown, after about the first whorl and a half a white zone appears below the suture, gradually widening until the upper half of the last whorl is white and the lower (basal) half chestnut-brown; whorls $5\frac{1}{2}$, plano-convex, suture indistinct, the last whorl is subcarinate and descends considerably at the mouth; mouth elongate oval, within it is chestnut-brown with white zones at the periphery and below the suture, lip well expanded and slightly reflected, chestnut-brown marked with white just below the insertion of the columella, columellar margin slanting, well reflected and almost covering the umbilicus.

Alt. (to base of lip) 15; diam. max. 20 millim.

Hab.—Gebi Island.

Papuina lanceolata*, Pfr.**var. ***pulehrizona, n. var.

Shell similar in shape to the typical form, but a trifle more elevated and the lower margin of the peristome a little more curved. Colour pattern of the base precisely as in the type, but there is a broad zone of a chestnut colour above the periphery leaving a narrow white zone both above and below it, the upper white zone being seen on earlier whorls.

Hab —Obi.

I think this is only a colour mutation, but as seen from above, it looks quite a distinct species. My specimen is not quite so beaked as the typical form, but this is probably not a constant character.

***Perrieria canefriana*, n. sp.**

Pl. ix, figs. 3, 4.

Shell sinistral, spire elongate and gradually tapering towards the apex, truncate, uniform dark chestnut brown in colour, somewhat polished; sculpture well marked lines of growth; whorls remaining 7, plano-convex, regularly increasing to the last whorl, very little, if at all, ascending in front; aperture somewhat pyriform, dusky brown within, peristome whitish, continuous, somewhat thickened, the outer margin a little expanded, and the columella rather twisted and truncate.

Alt, 2.4.5; diam. max. 6.4; alt. apert. 7.3, diam. apert. 5 millim.

Hab.—Obi.

This interesting discovery extends the range of the genus, hitherto known only from New Guinea. The present species is by far the smallest of the three described and may be separated from *P. minor*, Smith, by its darker colour, more tapering form, and by the columella being more twisted. As Mr. Pilsbry states ⁽¹⁾ "the internal structure of the shell has not been investigated," I have broken up a specimen, which is now figured. The axis is much twisted, and I am unable to trace any armature upon it. I doubt if *Perrieria* belongs to the *Megaspiridae*; may it not be really referable to the *Achatinidae*?

***Leptopoma ponsonbyi*, n. sp.**

Pl. ix, fig. 15.

Shell turritid, moderately umbilicated, obscurely marked by lines of growth, microscopically densely spirally striated, with a number of small filiform carinae, five on the last whorl but one, these carinae being most numerous in the umbilical region; colour horny brown with a pale zone just below the suture, this zone being marked with irregular blackish-brown blotches; whorls $5\frac{1}{2}$, convex; aperture round, duplex, the outer portion very widely expanded except on the columellar margin, flattened, bending a trifle backwards and the surface a little wrinkled.

Alt. 8.3; diam. max. (with lip) 8 millim.

Hab —Obi.

The forms at present recorded from Obi are, *latilabre*, Martens (described as a variety of *citreum*, Less.), *megalostoma*, Mildf., *fulgurans*, Dtz., and *altius*, Dtz. From all these the present species may be severed by its form (like *leucorrhaphe*, Martens) and the remarkable expansion of the lip. I much doubt if *L. fulgurans* really came from Obi; I have it from the same collector as from Batjan.

It gives me special pleasure to name this shell after Mr. J. H. Ponsonby, by whose knowledge I have so often profited.

***Leptopoma leucorrhaphe*, Martens.**

var. *cingillus*, n. var.

Shell like a dwarf *leucorrhaphe*, which it resembles in colour pattern, the height, however, is only 9 in place of 12 millim.; spirals more numerous and more closely-set, there being 6 instead of 5 on the last whorl but one. The habitat is Gebi in place of Dodinga, Halmahera, from which latter I have a typical specimen (coll. Doherty).

***Ameria plicaxis*, n. sp.**

Pl. ix, fig. 17.

Shell closely related to *Ameria obiana*, Rolle, but it may be at once distinguished by the shape of the spire, which in that species is very short and swollen, the upper whorls being very convex. In the present form the spire is drawn out and is of the usual "Physoid" shape: the columella has also the strong twisted fold characteristic of *A. obiana*.

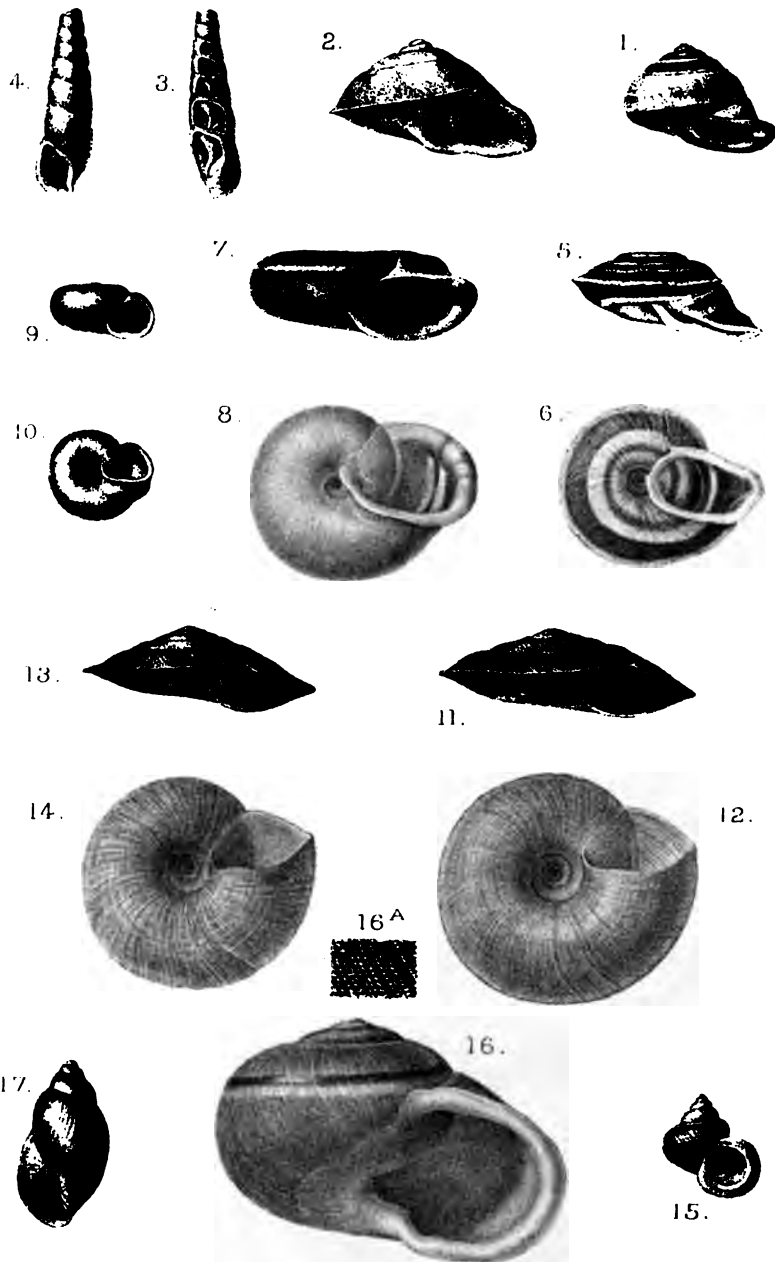
Alt. 22; diam. max. 11; alt. apert. 12; lat. apert. 5.5 millim.

Hab.—Obi.

It has been suggested to me that this may be the *Physa moluccensis* of Lesson. His description is very brief and I fancy the species will prove to be unidentifiable; it must however be sought in the fauna of Amboina. The only figure I have seen purporting to represent it is that in the "Conch.-Cab," which is certainly not the present species. It may also be noted that Lesson's shell was 18 millim. in height.

EXPLANATION OF PLATE IX.

- Fig. 1. *Papuina semibrunnea*, n. sp.
- Fig. 2. *Papuina colorata*, n. sp.
- Figs. 3, 4. *Perrieria canefriana*, n. sp.
- Figs. 5, 6. *Obba subgranulata*, n. sp.
- Figs. 7, 8. *Planispira (Cristigibba) gebiensis*, n. sp.
- Figs. 9, 10. *Planispira (Cristigibba) fruhstorferi*, n. sp.
- Figs. 11, 12. *Trochomorpha gulielmi*, n. sp.
- Figs. 13, 14. *Trochomorpha dautzenbergi*, n. sp.
- Fig. 15. *Leptopoma ponsonbyi*, n. sp.
- Fig. 16. *Albersia waigiouensis*, n. sp.
- Fig. 17. *Ameria plicaxis*, n. sp.



A.H. Searle del et lith

A.S. Huth, imp

NON-MARINE SHELLS FROM THE EAST INDIES.



THE HELICOID LAND SHELLS OF ASIA. CORRECTIONS AND ADDITIONS.

BY G. K. GUDE, F.Z.S.

THANKS chiefly to the careful and painstaking scrutiny to which Mr. Ponsonby has subjected my lists of the Helicoid Land Shells of Asia in the two previous volumes of this Journal, a number of slips and inaccuracies have come to light, and I have thought it useful to tabulate these. Several new species have in the meantime been published, a list of which is appended.

From Mr. H. Rolle, of Berlin, I have lately received, with some other Turkestan shells, two species which appear never to have been described, and although he informs me he thinks they were published some years ago in the "Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft," as I have been unable to trace them in this publication, I append diagnoses.

***Cathalca (Eucathalca) sturanyi*, Rolle, n. sp.**

Shell umbilicate, depressed-conoid, opaque, pale corneous above, pearly below, slightly fuscously streaked; finely striated, decussated with excessively fine spiral lines. Spire depressed, apex obtuse but rather prominent, sutures deep. Whorls 5, convex, rounded at the periphery. Last whorl not descending in front, slightly dilated at the mouth. Aperture oblique, subcircular; margins convergent, united by a thin callus on the parietal wall. Peristome whitish, scarcely thickened; upper and outer margins straight, basal margin slightly reflected, columellar margin slightly dilated, but not impinging upon the wide umbilicus which distinctly shows half the penultimate whorl.

Diam. maj. 19.5, min. 17; alt. 11 millim.

Hab.—Osh. Prov. Ferghana, Western Turkestan.

Three specimens. Type in my collection.

The new species resembles in shape *C. middendorffi*, Gerstf., but that shell is thinner, translucent, more depressed, possesses one more whorl, and has sometimes a peripheral band, while the aperture is less rounded, and the lower margin is more reflected and straight. It is also more distinctly striated and strongly sculptured spirally.

***Cathalca (Campylocathalca) hermanni*, Mlldff., n. sp.**

Shell narrowly umbilicated, conoid, pale fulvous above, whitish at the side and below, finely irregularly ribbed, decussated by microscopic spiral lines, which are more distinct near the aperture. Spire elevated, apex obtuse, suture impressed. Whorls 5—5½, rounded, tumid below, last whorl slightly de-

ending in front, a little shouldered above, and scarcely dilated at the mouth. Aperture subrotundate, margins approaching, united by a thin callus on the parietal wall; peristome white, slightly thickened; upper margin slightly ascending, straight, outer and lower margins reflected, columellar margin dilated overhanging the deep narrow umbilicus.

Diam maj. 13, min. 11.5; alt. 9 millim.

Hab.—Alexander Range, Issig Kul, Western Turkestan.

Three specimens Type in my collection.

Compared with *C. rettereri*, Rosen, its nearest ally, *C. hermanni* is smaller and more elevated in the spire. *C. rettereri*, moreover, has a white peripheral band, is smoother and possesses pronounced impressed spirals. Another closely allied species is *C. mesoleuca*, Mart., but that shell is still smaller, with a much narrower umbilicus, more flattened whorls and a white peripheral band.

CORRECTIONS.

VOLUME IX.

Page 7, 7th line, 1st col., delete = *frilleyi*, Cr. and Deb.

Page 7, 6th line, 2nd col., delete *constantiae*, H. Ad., and insert on page 8, between *Eucathaica fasciola*, Drap., and *E. cardiostoma*, Mdff.

Page 8, 6th line from below 1st col., delete *anceyi*, Mdff., and insert on page 6, between *Laeocathaica filippina*, Hde., and *L. subsimilis*, Desh.

Page 8, 4th line from below 2nd col., delete *dejeana*, Hde., and insert on page 6, between *Laeocathaica filippina* and *L. anceyi*, Mdff.

Page 53, 26th line, 2nd col., for *Fruticicola mesoleuca*, Mart., read *Campylocathaica mesoleuca*, Mart.

Page 100, 29th line, 1st col., for Genus *Vitrea*, Fitz., read genus *Polita*, Held.

Page 102, 33rd line, 1st col., for *Vitrea aequata*, Mouss., read *Polita aequata*, Mouss.

Page 104, 1st col., the three species placed under *Vitrea* transfer to *Polita*.
2nd line, 1st col., for *patuliformis* read *patulaeformis*.

7th line from below, 2nd col., for *lenkoreana* read *lenkoranea*.

Page 112, 9th line, for *Vitrea* read *Polita*.

22nd line, 1st col., for Genus *Vitrea*, Fitz., read Genus *Polita*, Held.

25th line, 1st col., for *cyprea* read *cypria*.

Page 115, 3rd line from below, 1st col., delete *v. anprazonata*, Mouss.

Page 116, 6th line, 2nd col., for Mart. read Mort.

Page 117, 2nd line, 1st col., for *lenkorana* read *lenkoranea*.

Page 118, 7th line, 2nd col., for *erdelli* read *erdellii*

Page 120, 15th line, 2nd col., for *asemnis*, Bourg., read *solida* (Zglr.), Kob., = *asemnis*, Bourg., = *ciliciana*, Bourg.

Page 120, 27th line, 1st col., for *Byzantium* read *Byzantium*.

Page 121, 8th line, 1st col., for Genus *Vitrea*, Fitz., read Genus *Polita*, Held.

- 10th and 28th line, 2nd col., delete = *rissoana*, Pfr.
 12th line 1st col., for *Retinella aequata*, Mouss., read *Polita aequata*,
 Mouss.
 20th line, 2nd col., for *asemnys* read *asemnys*.
 25th line, 1st col., for Genus *Vitrea*, Fitz., read Genus *Polita*, Held.
 Page 122, 3rd line, 1st col., for Genus *Vitrea*, Fitz., read Genus *Polita*,
 Held.
 8th line, 1st col., for *Retinella aequata*, Mouss., read *Polita aequata*,
 Mouss.
 9th and 10th lines, 1st col., transfer *Retinella hydatina*, Rossm. and
R. sorella, Mouss., to *Vitrea*.
 17th line, 1st col., for *cyprea* read *cypria*.
 Page 123, 19th line, 1st col., for *Vitrea protensa*, Fér., read *Polita*
protensa, Fér.
 Page 126, 22nd line, 2nd col., for *Retinella aequata*, Mouss., read *Polita*
aequata, Mouss.
 25th line, 2nd col., for *Retinella protensa*, Fér., read *Polita protensa*,
 Fér.
 Page 128, 10th line from below, 1st col., for *crenophila*, Pfr., = *mus-*
colica, Bourg., read *muscolica*, Bourg., = *crenophila*, Pfr.
 Page 129, 5th line, 2nd col., for *Borug*, read Bourg.
 16th line, 1st col., delete *beilanica*, West.
 18th line, 1st col., *asemnys*, Bourg., = *solida*, Zglr., read *solida*,
 Zglr., = *asemnys*, Bourg.

VOLUME X.

- Page 9, 8th line, 1st. col., for *hupensis*, Hde., read *hupensis*, Gredl.
 Page 11, 4th line, 2nd col., for *ptychostyla*, Mts., read *ptychostyla*, Pfr.
 32nd line, 1st col., for Genus *Microcystina*, Mörch, read Genus
Sesara, Alb., and with *annamitica*, Cr. and F., place below *Kaliella bouyeri*,
 Cr. and F.
 Page 12, 22nd line, 1st col., delete *promiscua*, Smith.
 31st line, 1st col., for *Hemiplecta danae*, Pfr., read *Euplecta danae*, Pfr.
 Page 13, 29th line, 1st col., for *Coneuplecta globulosa*, Mdff., read
Coneuplecta möllendorffi, n.n. = *globulosa*, Mdff., Nachr. Bl., 1901, p. 112,
 not *globulosa*, Mdff., Nachr. Bl., 1900, p. 120.
 Page 50, 4th line from below, 2nd col., for *Helicarion lowi*, de Morg.,
 read *Nilgiria lowi*, de Morgan, fide Collinge.
 32 line, 2nd col., for *sakayana*, de Morg., read *sakaya*, de Morg.
 Page 52, under 9th line, 1st col., insert section *Trichochlorites*, Pils.
 Page 55, 24th line, 1st col., delete = *cryptopila*, Mouss. in coll.
 Page 56, 7th line, 2nd col., for *helicincides*, Mouss., read *helicinoides*
 v, *cryptopila*, Mouss.

Page 58, 24th and 25th line, 1st col., delete *kinabaluensis*, Smith and *v. pallida*, Smith, and transfer to page 56 under *Trochonanina labuanensis*, Pfr.

Page 59, 8th line, 1st col., for Genus *Macrochlamys*, Bens., read Genus *Everettia*, G.-A.

Page 62, 18th line, 1st col., for Mart., read Soul.

Page 83, 19th to 23rd lines, 1st col., *trochus*, Müll., and synonyms, *stuartiae*, Sowb., and *nemorensis*, Müll., transfer to 2nd col., under *Hemiplecta*.

Page 86, 3rd line from below, 1st col., for Genus *Microcystina*, Mörch read Genus *Lamprocystis*, Pfr.

Page 88, under 30th line, 1st col., insert section *Trichochloritis*, Pils.

Page 92, 19th line, 2nd col., for *unicolor* (Mdff.), Dautz., = *pseudolanceolata*, read *pseudolanceolata*, Dautz., = *unicolor* (Mdff.), Dautz., non Pfr.

Page 97, 9th line, 1st col., for Genus *Otesia*, H. Ad., read Genus *Coneuplecta*, Mdff.

ADDITIONS.

VOLUME IX.

Page 6, 1st col., under *Euplecta dichromatica*, Mor., insert Genus *Coneuplecta*, Mdff. *mecongana*, Mdff., Laos.

Page 7, 1st col., after 4th line *ravidula* insert *globosa*, Preston, Shan-tung.

Page 52, under Tibet add, *Euconulus fulvus*, Drap. N.E. Tibet. *Pliocathaica orithya v. conica*, Andr. Baa Valley. *P. pulveratrix v. strigillata*, Andr. Wan-saong

Page 53, under Eastern Turkestan add *Pliocathaica orithya v. unifasciata*, Andr. Kaschgar. Under Mongolia add, *Euconulus fulvus*, Drap. Tarim Basin. *Zonitoides nitidus*, Müll. Kuldja.

Page 99, after 5th line, 2nd col., *diaphora*, West., insert *krynckii*, Andr. Kopet Dagh. After 19th line, 1st col., insert *mesoleuca*, Mart. Ferghana.

Page 102, under Mesopotamia add, *Levantina michoniana*.

Page 104, under 17th line, 1st col., *Helicidae*, insert Group *Haplogona*, Genus *Pyramidula*, Fitz., *rupestris*, Drap. Schah Rud.

Page 116, under 32nd line, 2nd col., *Levantina ceratomma*, Pfr., insert *casta*, West. In 1st col., under *Zonites*, Montf., add, *anthesi*, Kob. Pergamos, and *insignis*, Naeg. Gulek, Cilicia. In 2nd col., under *Tachea atrolabiata*, Kryn., add the following varieties: *intercedens*, Ret. Batoum; *maxima*, Kob. Suchum Kaleh; *decussata*, Bttgr. Kutais; *albolabiata*, Kob.; *hyrcana*, Dohrn. Rescht, and *malleata*, Kob. Lenkoran.

Page 118, 2nd col., under *Pyramidula*, Fitz., add, *rupestris*, Drap. Gulek, Cilicia. Under *Heliomanes derbentina*, insert *millepunctata*, Bttgr.

Page 119, 1st col., under *Jacosta rozeti*, Mich., insert *subcalcarata*, Naeg. Kissik.

Page 120, under 19th line, 1st col., *atrolabiata*, Kryn., insert *v. intercedens*, Ret. Trebizond. Under 23rd line, 1st col., *ainophila*, Bourg., insert *triangula*, Naeg. Eski Schehir. Under 5th line, 2nd col., *v. taurica*, Kryn., insert *salisi*, Mab Lebanon. Under 14th line, 2nd col., *v. anatolica*, Kob., insert *v. trojana*. Kob. Trojad, and *v. libanica*, Kob. Lebanon. Under 15th line, 2nd col., *solida*, Zglr., insert *v. ionica*, Mart Gulek. Under 22nd line, 2nd col., *pathetica*, Parr., insert *pomacella v. attalus*, Kob. Pergamos. Under 28th line, 2nd col., *issica*, Kob. and Rolle, insert *blumi*, Kob. Cilicia. Under 34th line, 2nd col., *escherichi*, Bttgr., insert *nucula v. merssinae*, Kob.

Page 122, under *Kalymnos*, after *Levantina spiriplana*, Oliv., add *v. valentini*, Kob.

Page 126, after 6th line, 1st col., *v. cypria*, Kob., insert *cornarae*, Kob.

Page 127, under *Heliomanes derbentina* insert *millepunctata*, Bttgr.

Page 129, under *Helicogena* add, *dickhauti*, Kob. ? Palestine, and *pseudopomatia*, Kob. Cherkli.

VOLUME X.

Page 13, 2nd col., under *Helicarion siamensis*, Haines, insert Genus *Microparmarion*, Simr., *bruneopallescens*, Cllge., *annamica*, Cllge. = *andamanica*, Cllge. Mekong Valley.

Page 50, under *Perak* add, *Damayantia minima*, Cllge.

Page 52, under *Nawng Chik* add, *Euplecta bijuga*, Stol., *Macrochlamys splendens*, Phil., *Dyakia salangana v. martensi*, Cllge., *Hemiplecta sakaya*, de Morg., *Nilgiria lowi*, de Morg., *Ariophanta janus*, Chemn., *Parmarion malayana*, Cllge., *Trochomorpha timorensis*, Mart., *Sitala infula*, Bens.

Page 57, under 20th line, 1st col., *v. atrofusca*, Mart., insert *v. annectens*, Mart. In 2nd col., under *Damayantia*, Issel, add, *simrothi*, Cllge., *rugosa*, Cllge.; under *Parmarion*, P. Fisch., add, *shelfordi*, Cllge.; under *Collingea*, Simr., *eranna*, Cllge.

Page 58, under 7th line, 2nd col., *martensi*, Bttgr., insert *v. capistrata*, Mart. Under 16th line, 2nd col., *v. angulata*, Fult., insert *v. obliquata*, Mart. Under 34th line, 1st col., *quadrivolis*, Mart., insert *semiquadrivolis*, Mart.

Page 59, under 23rd line, 2nd col., *inquieta*, Dohrn, insert *brachystoma*, Mart. Under 29th line, 2nd col., *v. everetti*, Fult., insert *waterstraati*, Rolle, and *weyersi*, Dautz.

Page 61 2nd col., bottom of page, insert h. 2. Doat Island. Genus *Everettia*. G.-A., *consul*, Pfr., and *jucunda*, Pfr.

Page 90, 1st col., bottom of page, insert a. 2. Gebi. *Xesta aulica*, Pfr. *Planispira kurri*, Pfr., *Papuina unicolor*, Pfr., = *Ampelita unicolor*, Auct., *P. fallax*, Fult., and *Albersia subsphaerica*, Fult.

Page 92, after 3rd line, 2nd col., *kurri v. obiensis*, Dautz., insert Subgenus *Cristigibba*, Can., *albopicta*, Sykes.

Page 98, add to Index, Bunguran. E. l. 1. Doat Island. E. h. 2. Dwars in de Weg. D. f. Gebi. H. a. 1. Mengalun (E. f.). Roma. G. k. 2 (see Vol. X, p. 130).

NOTE.

Note on Two varieties of *Arion subfuscus*, Drap. Mr. H. Overton has recently submitted to me for identification two examples of *Arion subfuscus*, Drap., collected by him in Sutton Park, Sutton Coldfield.

The larger of the two specimens, although not quite full grown is undoubtedly referable to the variety *flagellus*, Cllge., described by me in 1893 (Ann. and Mag. N. H., 1893, s. 6. vol. xii, p. 252) as *Arion flagellus*.

The smaller specimen, when alive, exhibited two dark grey lateral bands, the portion beneath being white as well as the foot-fringe and foot sole. The whole of the dorsum was a light grey; the mantle similar to the type.

WALTER E. COLLINGE.

CURRENT LITERATURE.

Pilsbry, Henry A.—Manual of Conchology, ser. ii, vol. xvii (pt. 65), pp. 1—64, pls. 1—10. Philadelphia: Academy of Natural Sciences.

With the commencement of volume xvii the genus *Achatina*, Lamarck, is dealt with. After a few notes on the distribution, parasites and nomenclature, a key to the West African species is given, and the systematic review commenced.

The following new forms are described: *A. achatina*, L. var. *monochromatica*, from Angola, and *A. occidentalis*, from Corisco Island, West Africa. *A. panthera*, Fér. var. *leucostyla*, Wasin Island, northern Zanzibar, var. *chrysoderma*, from Mauritius, and *A. fulica*, Fér. var. *coloba*.

Jones, K. H. and Preston, H. B.—List of Mollusca collected during the commission of H.M.S. "Waterwitch" in the China Seas, 1900—1903, with descriptions of new species. Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 138—151, 7 figs. in text.

One hundred and seventeen species are listed of which the following are new: *Eulota globosa*, *Limnaca mars*, L. (*Gulnaria*) *whartoni*, L. (G.) *shantungensis*, L. (G.) *pettiti*, *Assiminea norburyi*, and *Pecten (Chlamys) farreri*.

Petch, T.—The Published Records of the Land and Fresh Water Mollusca of the East Riding [of Yorkshire], with Additions. Trans. Hull Sci. and Field Nat. Club, 1904, vol. iii, pp. 121—172, pls. xii, xiii.

Mr. Petch's paper forms an admirable resumé of the work done in this particular district on the Land and Freshwater Mollusca, but it is greatly to be regretted that, at a time when malacologists are prepared to sink all petty differences as to special views on nomenclature, in order to obtain uniformity, that the old nomenclature has here been adhered to; apart from this feature, the list is admirable and reflects great credit on its author.

Sykes, E. R.—On a new species of *Amastra* from the Hawaiian Islands. Ann. and Mag. N. H., 1904 (s. 7), vol. xiv, pp. 159, 160, 2 figs.

Amastra (Kauaia) rex, n. sp., somewhat recalls in form and appearance *Helicina agglutinaus*. It belongs to the group of *A. alata*, Pfr., and *A. heliciformis*, Ancy.

Ellot, C. N. E.—On the *Doris planata* of Alder & Hancock. Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 180, 181.

The author has examined specimens of *Platydoris planata* from Plymouth, and finds that they have all the essential characters of the genus *Geitodoris*. Whether or not the *G. complanata*, Bergh, is specifically distinct is doubtful, but if the same, the name *planata* (A. and H., 1855) has priority. Possibly the *Platydoris planata* examined by Garstang may be distinct from those now described,

Hedley, C.—Studies on Australian Mollusca. Pt. viii. Proc. Linn. Soc. N.S.W., 1904, pp. 182—211, pls. viii—x.

The author points out that the *Coxiella confusa*, Smith, is the same as *C. badgerensis* (Johnst.) which latter name has priority, and that the *Bythinia richmondiana*, Petterd, must yield to the prior *Hydrobia petterdi*, Smith. To the same species is referred the *Pupa anodonta* of Musson and Hedley. Descriptions and figures of fourteen new species are given and one new genus *Sliva*, allied to *Rissoina* (type *S. ferruginea*, n. sp.), in addition to which many species are figured for the first time. *Lima sydneyensis* is a new name for *L. brunnea*, Hedley non Cooke.

Smith, Edgar A.—Note on *Terebra hedleyi*, Tate. Ibid., pp. 211, 212.

Mr. Smith points out that this is not a *Terebra*. The late Professor Tate stated that *Cingulina brazieri*, Angas, belonged to the genus *Terebra* and as the species-name was already in use in the latter genus, he changed it to *hedleyi*.

The author adds that he very much doubts whether this so-called species is anything more than a variety of *C. circinata*, A. Adams.

Roebuck, W. D.—Re-establishment of *Limax tenellus* as a British species. Journ. Conch., 1904, vol. ii, pp. 106—109.

All malacologists who take any interest in the Slug fauna of the British Isles will be pleased to learn that the author has satisfactorily established this slug as a member of our fauna. From the pine-woods of the Forest of Rothiemurchus, in the Vice-county of Easternness many examples have been received, also from Clackmannshire, about Inver, near Dunkeld, Perthshire, and Invercannie, near Banchory, Kincardineshire.

Hoyle, William E.—Report on the Cephalopoda. From Rpt. on Pearl Oyster Fisheries of the Gulf of Manaar. Roy. Soc. Lond., 1904.

The collection of Cephalopoda obtained by Prof. Herdman, though small, contains several novelties. The Octopods preponderate, and many are immature.

The new species are *Polyopus herdmani* and *P. arborescens*. In this latter the surface presents a number of branched papillae; there are one or two over each eye, about a dozen on the back, a few on the ventral surface, and in most cases one or two on the outer aspect of each arm. The nature of these bodies is, as yet, very obscure. The possibility of their being either glandular or phosphorescent seems to be excluded by the fact that the fibrils come up to and give off a radiating tuft, whilst against a sensory function is urged the fact of the fusion of their lower portion with the surrounding tissues, and as yet no nerves have been traced to them. Possible, although it seems very doubtful, they may be parasitic.

Bartsch, Paul.—Notes on the genus *Sonorella*, with descriptions of new species. Smiths. Miscell. Coll., 1904, vol. 47, pp. 187—200, pls. xxviii—xxxiii.

The author finds that a careful examination of the nuclear whorls shows variations along different lines, and these may be utilised in grouping the species. Upon these variations he divides the genus up into four groups, viz., i. Group of *S. wolcottiana*, ii. Group of *S. hachitana*, iii. Group of *S. magdalenensis*, and iv. Group of *S. fisheri*.

In the second group *S. ashmuni*, *S. nelsoni*, *S. goldmani*, *S. merrilli*, *S. dalli*, *S. mearnsi*, and *S. baileyi* are new species, with a new subspecies of the latter, *orcutti*. In the fourth group *S. fisheri* is also new.

All the species are well illustrated.

Bartsch, Paul.—A new species of *Amphidromus*. Ibid., pp. 292, 293, pl. xlvii.
A. gossi, n. sp., from Mount Kin Baloo, North Borneo, 13,000 feet.

Pallary, Paul.—Addition a la faune Malacologique du Golfe de Gabès. Journ. de Conchyl., 1904, vol. lii, pp. 212—248, pl. vii.

The author describes and figures ten new species and five subspecies from this region.

Conturier, M.—Catalogue des Coquilles Paléarctiques de la Collection Hagenmüller. Ann. Mus. d'Hist. Nat. Marseille-Zoology, 1903, T. viii, pp. 21—67.

Vayssière, A. Recherches zoologiques et anatomiques sur les Mollusques Opisthobranches ou Golfe de Marseille. Supplement. Ibid., pp. 73—108, pls. ii, iii.

Heath, Harold.—The habits of a few Solenogastres. Zool. Anz. 1904, Bd. 27, pp. 457—461.

Roebuck, W. D.—Radnorshire Slugs. Journ. Conch., 1904, vol. xi, p. 128.

Fischer, H. et Dautzenberg, Ph.—Catalogue des mollusques terres et fluviatiles de l'Indo-Chine orientale cités jusqu'à ce jour. Mission Pavie, 1904, pp. 1—61.

Fischer, H.—Remarques sur le *Columbella terpsichore*, Sow., et sur l'*Euchelus erythraeensis*, Stur. Journ. de Conchyl., 1904, vol. lii, pp. 59, 60.

Dautzenberg, Ph. et Dollfus, G. F.—Études critiques sur la nomenclature avec examen des genres *Pectunculus* et *Glycimeris*, Ibid., pp. 109—122.

Vayssière, A.—Étude zoologique de l'*Archidoris stellifera*, H. von Ihering. Ibid., pp. 123—130, pl. iv.

Lamy, Edouard.—Liste des Arches conservées avec étiquettes de Lamarck dans les collections du Muséum de Paris. Ibid., pp. 132—167, pl. v.

Randles, W. B.—Some observations on the Anatomy and Affinities of the *Trochidae*. Quart. Journ. Micros. Sci., 1904, vol. 48, pp. 33—78, pls. iv.—vi.

Melvill, J. Cosmo.—Descriptions of twenty-eight species of Gastropoda from the Persian Gulf, Gulf of Oman, and Arabian Sea, dredged by Mr. F. W. Townsend, of the Indo-European Telegraph Service, 1900—1904, Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 158—169, pl. x.

Melvill, J. Cosmo.—*Conus coromandelicus*, Smith, its probable affinities, and systematic position in the family *Conidae*. Ibid., pp. 170—173, figs. 1, 2.

EDITOR'S NOTES.

On completing another volume, the Editor tenders his grateful thanks to all who have in any way furthered the interests of the Journal during 1904.

It is with feelings of deep regret that we learn of the death of Professor E. von Martens.

INDEX TO VOLUME XI.

A.	PAGE		PAGE
<i>Aclis thesauraria</i> , n. sp. (figs.)	79	Conke, Rev. A. H.—"Note on <i>Testacella haliotide</i> , Drap."	49
<i>Albersia subsphaerica</i> , n. sp. (figs.)	54	<i>Coralliophila dissimulans</i> , n. sp. (figs.) ...	77
<i>Albersia waigiouensis</i> , n. sp. (figs.)	<i>Cordila</i> (?) <i>minima</i> , n. sp. (fig.)	41
<i>Ameria plicaxis</i> , n. sp. (fig.)	...	<i>Corilla erronella</i> , Nev., MS. (figs.)	45
<i>Ampullarina africana</i> , n. sp. (fig.) ...	31	<i>Cultellus decipiens</i> , n. sp. ...	39
Anatomy of the Generative Or- gans of <i>Ariophanta juliana</i> , Gray. (figs.)	12	Current Literature. 16, 50, 70,	98
Ancey, C. F.—"Report on semi- fossil Land Shells found in Hamakua district, Hawaii."	65	<i>Cynisca forticostata</i> , n. sp. (figs.)	38
<i>Ancilla albozonata</i> , n. sp. (fig.)	29	<i>Cythara nevilliana</i> , n. sp. (figs.)	75
<i>Ancilla reevei</i> , n. sp. (fig.)	29		
<i>Arion hortensis</i> , Fér. Absence of male Generative Organs in	15	D.	
<i>Arion subfuscus</i> from the Orkney Isles. ...	15	<i>Daphnella eulimenes</i> , n. sp. (fig.)	84
<i>Arion subfuscus</i> , Drap. Note on two varieties of ...	98	<i>Daphnella</i> (?) <i>sulcata</i> (Sowerby).	28
<i>Arion subfuscus</i> var. <i>flagellus</i> , Clige. ...	98	Description of a new species of <i>Ariunculus</i> from Algeria. ...	47
<i>Ariophanta juliana</i> , Gray. Notes on the anatomy of the gener- ative organs of (figs.)	12	Descriptions of new species of Land Shells from Gebi Island, Moluccas. ...	53
<i>Ariunculus</i> from Algeria. De- scription of a new species of	47	Descriptions of new species and remarks upon a few other previously described forms, of Marine Shells from Port Alfred, Cape Colony. ...	26
<i>Ariunculus pallaryi</i> , n. sp.	Descriptions of new species of semi-fossil shells in Hama- kua district, Hawaii. 56, 65	...
		Descriptions of some new species of Cingalese and Indian Marine Shells. ...	75
B.		Descriptions of twelve new spe- cies of Marine Gastropoda from the Persian Gulf, etc.	79
<i>Bullia trifasciata</i> , n. sp. (fig.)	34	<i>Drillia albonodulosa</i> , n. sp. (fig.)	27
		<i>Drillia nivosa</i> , n. sp. (fig.)	27
C.		<i>Drillia praetermissa</i> , n. sp. (fig.)	27
<i>Cardita</i> (?) <i>minima</i> , n. sp. (fig.)	41	<i>Drillia subcontacta</i> , n. sp. (fig.)	26
<i>Carditella laticostata</i> , n. sp. (fig.)	41	<i>Drillia thetis</i> , n. sp. (fig.)	26
<i>Cathaica (Campylocathaica) her-</i> <i>manni</i> , Mildf., n. sp. ...	93		
<i>Cathaica (Eucathaica) sturanyi</i> , Rolle, n.sp. ...	93	E.	
<i>Clathurella bulleni</i> , n. sp. (figs.)	75	Editor's Notes. ...	20, 100
<i>Clathurella crassilirata</i> , n. sp.	27	<i>Endodonta (Thaumatodon) hen-</i> <i>shawi</i> , n. sp. (figs.) ...	66
Collinge, Walter E.—"Notes on Slugs and Slug-like Mol- luscs." ...	14	<i>Endodonta, hystricella</i> , Pfr. var. <i>paucilamellata</i> , n. var. (fig.)	67
—"Description of a new species of <i>Ariunculus</i> from Algeria." ...	47	<i>Endodonta laminata</i> , Pease. (fig.)	66
—"Note on <i>Parmacella</i> <i>deshayesii</i> , Moq.-Tand." ...	49	<i>Ethalia africana</i> , n. sp. (figs.)	38
—"Note on Two Varieties of <i>Arion subfuscus</i> , Drap."	98	<i>Ethalia carneolata</i> , Melv., var. <i>rubrostrigata</i> , n. var. (figs.)	80
<i>Columbella</i> (?) <i>pyramidalis</i> , Sow- erby. ...	30	<i>Eulima distincta</i> , n. sp. (fig.)	35
		<i>Eulima (Subularia) hypolysina</i> , n. sp. (fig.) ...	83
		<i>Eulimella acaca</i> , n. sp. (fig.)	81
		<i>Eulimella minor</i> , n. sp. (fig.)	36
		<i>Eulimella nivea</i> , n. sp. (fig.)	36

F.		M.	
	PAGE		PAGE
Fulton, Hugh.—"Notes on <i>Thersites</i> (<i>Hadra</i>) <i>bellendenkerensis</i> , Braz., and <i>beddomae</i> , Braz."	1	<i>Macomia litoralis</i> , Krauss. ...	78
— "A Critical List of the <i>Sphærospira</i> Section of <i>Thersites</i> ."	2	<i>Maetra delicatula</i> , n. sp. (fig.) ...	78
— "On some new species of <i>Melania</i> and <i>Jullienia</i> Yunnan and Java." ...	51	<i>Maetra delicatula</i> var. <i>nivea</i> , n. var. (fig.)	78
— "On a collection of Land Shells from Gebi Island, Moluccas, with description of new species." ...	53	<i>Maetra laprobanensis</i> , n. sp. (fig.)	78
— "Note on <i>Leptopoma crenilabre</i> , Strubell." ...	55	Malacological Society. I roceedings of the Midland ...	15
<i>Fusus cingulatus</i> , n. sp. (fig.) ...	30	<i>Mangilia alfredi</i> , n. sp. (fig.) ...	29
G.		<i>Mangilia posidonia</i> , n. sp. (fig.) ...	84
<i>Glyphostoma siren</i> , n. sp. (fig.) ...	28	<i>Marginella differens</i> , n. sp. (fig.) ...	32
Gude, G. K.—"Note on <i>Corilla erronella</i> , Nev., MS." ...	45	<i>Marginella dulcis</i> , n. sp. (fig.) ...	32
— "The Helicoid Land Shells of Asia. Corrections and Additions."	93	<i>Marginella munda</i> , n. sp. (fig.) ...	31
H.		<i>Marginella pscustes</i> , n. sp. (fig.) ...	32
Hawaiian Isles. Molluscan fauna of	56	<i>Marginella pura</i> , n. sp. (fig.) ...	31
Henshaw, H. Wetherbee.—"On Certain deposits of semi-fossil Shells in Hamakua district, Hawaii, with descriptions of new species." ...	56	<i>Matilda carystia</i> , Melv. & Stand. (fig.)	84
Heynemann, D. F.—"Some Recent Slug Papers." ...	48	<i>Melania aeruginosa</i> , n. sp. (fig.) ...	51
<i>Hochstetteria limoides</i> , n. sp. (fig.) ...	42	<i>Melania dulcis</i> , n. sp. (fig.) ...	51
<i>Hochstetteria velaine</i> , n. sp. (fig.) ...	42	<i>Melania fortitudinis</i> , n. sp. (fig.) ...	51
J.		<i>Melania laula</i> , n. sp. (fig.) ...	52
<i>Jullienia carinata</i> , n. sp. (fig.) ...	52	Melville, James Cosmo.—"Descriptions of Twelve new species and one variety of Marine Gastropoda, from the Persian Gulf, Gulf of Oman, and Arabian Sea, collected by Mr. F. W. Townsend. 1902-1904." ...	79
L.		"Note on <i>Mitra stephanucha</i> , Melv., with description of a proposed new variety." ...	80
<i>Lepton fortidentatus</i> , n. sp. (fig.) ...	41	<i>Mitra (Callithea) stephanucha</i> , Melv. (fig.)	80
<i>Leptopoma crenilabre</i> , Strubell. (fig.)	55	<i>Mitra (Callithea) stephanucha</i> , var. <i>astephana</i> , n. var. (fig.) ...	80
<i>Leptopoma gebiensis</i> , n. sp. (fig.) ...	54	<i>Mitromorpha volva</i> , Sowerby, var. (fig.)	31
<i>Leptopoma leucorrhaphæ</i> , Martens var. <i>cingillus</i> , n. var. ...	92	<i>Modiola tenerima</i> , n. sp. (fig.) ...	42
<i>Leptopoma ponsonbyi</i> , n. sp. (fig.) ...	91	<i>Mucronalia birtsi</i> , n. sp. (figs.) ...	77
<i>Lima perfecta</i> , n. sp. (fig.) ...	43	<i>Mumiola carbacea</i> , n. sp. (fig.) ...	83
<i>Limopsis pumilio</i> , n. sp. (figs.) ...	43	<i>Murex (Ocinebra) sykesi</i> , n. sp. (figs.)	76
List of semi-fossil Land Shells of Hawaiian Isles.	63	N.	
List of Species of Marine Shells from Port Alfred, Cape Colony.	22	<i>Nassa poclosticta</i> , n. sp. (fig.) ...	33
<i>Lucina despecta</i> , n. sp. ...	40	<i>Nassa (Phrontis) gangetica</i> , n. sp. (figs.)	76
<i>Lucina valida</i> , n. sp. (fig.) ...	40	<i>Nassa (Phrontis) siva</i> , n. sp. (figs.) ...	76
<i>Lyropupa magdalenæ</i> , Anc. var. <i>prisca</i> , n. var. (fig.) ...	68	<i>Natica decipiens</i> , n. sp. (fig.) ...	34
<i>Lyropupa mirabilis</i> , Anc. var. <i>hawaiiensis</i> n. var. (fig.) ...	68	<i>Natica natus</i> , n. sp. (fig.) ...	34
		O.	
		<i>Obba subgranulata</i> , n. sp. (figs.) ...	89
		<i>Odostomia doricæ</i> , n. sp. (fig.) ...	82
		<i>Omphalius collingei</i> , n. sp. (fig.) ...	80
		Orkney Isles. <i>Arion subfuscus</i> from the	15
		<i>Oscilla faceta</i> , n. sp. (fig.) ...	82
		<i>Oscilla jocosa</i> , n. sp. (fig.) ...	82
		Overton, H.—"Notes on the Anatomy of the Generative Organs of <i>Ariophanta juliana</i> , Gray."	12

P.	PAGE
<i>Papuina ecolorata</i> , n. sp. (fig.) ..	90
<i>Papuina fallax</i> , n. sp. (figs.) ...	53
<i>Papuina lanceolata</i> , Pfr. var.	
<i>fulchrizonæ</i> , n. var. ...	91
<i>Papuina semibrunnea</i> , n. sp. (fig.)	90
<i>Papuina unicolor</i> , Pfr. Habitat of	53
<i>Parmacella deshayesii</i> , Moq-	
Tand. Note on ...	49
<i>Perrieria canefriana</i> , n. sp. (fig.)	91
<i>Planispira</i> (<i>Cristigibba</i>) <i>fruhstor-</i>	
<i>feri</i> , n. sp. (figs.) ...	89
<i>Planispira</i> (<i>Cristigibba</i>) <i>gebiensis</i> ,	
n. sp. (figs.) ...	88
<i>Planispira</i> (<i>Cristigibba</i>) <i>gebiensis</i> ,	
variety of ...	88
<i>Planispira</i> (<i>Vulnus</i>) <i>endoplycha</i> ,	
Maïtens var. <i>depressa</i> , n.	
var. ...	88
Preston, H.B.—"Descriptions	
of some new species of	
Cingalese and Indian Ma-	
rine Shells." ...	75
Proceedings of the Midland	
Malacological Society. ...	15
<i>Pseudohyalinia meniscus</i> , n. sp.	
(figs.) ...	65
<i>Punctum horneri</i> , n. sp. (figs.) ...	66
<i>Purpura texturata</i> , n. sp. (fig.)	32
R.	
<i>Rissoa conspecta</i> , n. sp. (fig.) ..	35
<i>Rissoa perfecta</i> , n. sp. (fig.) ..	35
<i>Rissoina alfredi</i> , n. sp. (fig.) ...	35
<i>Rissoina</i> (<i>Phosinella</i>) <i>phormis</i> , n.	
sp. (fig.) ...	80
S.	
<i>Semele capensis</i> , n. sp. (figs.) ..	39
Slug Papers. Some recent ...	48
Slugs. Notes on. and Slug-	
like Molluscs. ...	14
Slugs. On a new and interesting	
genus of ...	14
Smith, Edgar A.—On a collec-	
tion of Marine Shells from	
Port Alfred, Cape Colony.	12
<i>Solarium</i> (<i>Torinia</i>) <i>admirandum</i> ,	
Melv. and Stand. (fig). ...	84
<i>Sphocrospira</i> Section of <i>Thersites</i> .	
A critical list of the ...	2
<i>Sphocrospira</i> . Species placed	
under, by Pilsbry. ...	10
<i>Styloptogma lacteola</i> , n. sp. (fig.)	77
<i>Succinea gibba</i> , n. s.p. (figs.) ...	62
<i>Succinea maxima</i> , n. sp. (figs.)...	61
<i>Succinea mirabilis</i> , n. sp. (fig.)	61
<i>Succinea pristina</i> , n. sp. (figs.)...	62

<i>Succineidae</i> of Hawaii. ...	56
Sykes, E. R.—"On some Non-	
Marine Shells from the	
Austro and Indo-Malayan	
Region." ...	87

T.

<i>Tellinmya similis</i> , n. sp. (fig.) ..	41
<i>Tellina regularis</i> , n. sp. (fig.) ...	39
<i>Terebra suspensa</i> , n. sp. (fig.) ...	30
<i>Testacella haliotideæ</i> , Drap. Note	
on ...	49
<i>Thala ceylanica</i> , n. sp. (figs.) ...	76
<i>Theora ovalis</i> , n. sp. (fig.) ...	39
<i>Thersites</i> . A critical list of the	
<i>Sphocrospira</i> section of ...	2
<i>Thersites concors</i> , n. sp. (fig.) ...	8
<i>Thersites eltheridgei</i> , Brazier. (fig.)	9
<i>Thersites lessoni</i> v. <i>lutea</i> , n. var.	
(fig.) ...	4
<i>Thersites mulgravensis</i> , Brazier.	
(fig.) ...	7
<i>Thersites mulgravensis</i> v. <i>palm-</i>	
<i>ensis</i> , Brazier. (figs.) ...	7
<i>Thersites mulgravensis</i> v. <i>merid-</i>	
<i>ionalis</i> , Brazier (figs.) ..	8
<i>Thersites</i> (<i>Hadra</i>) <i>bellendenker-</i>	
<i>ensis</i> , Braz. Notes on ...	1
<i>Thersites</i> (<i>Hadra</i>) <i>beddomæ</i> ,	
Braz. Notes on ...	1
<i>Tornatellina cyphostyla</i> , n. sp.	
(figs.) ...	70
<i>Tornatellina nudicostata</i> , n. sp.	
(figs.) ...	70
<i>Trifora convexa</i> , n. sp. (fig.) ...	37
<i>Trifora fuscescens</i> , n. sp. (fig.) ...	37
<i>Trifora fuscomaculata</i> , n. sp.	
(fig.) ...	37
<i>Trochomorpha dautzenbergi</i> , n.	
sp. (figs.) ...	87
<i>Trochomorpha gulelmi</i> , n. sp.	
(figs.) ...	87
<i>Turbonilla decora</i> , n. sp. (fig.) ...	36
<i>Turbonilla gemmula</i> , n. sp. (fig.)	36
<i>Turritella illustris</i> , n. sp. (fig.) ...	81

V.

<i>Vitrea hawaiiensis</i> , n. sp. ...	65
<i>Vulnus</i> , n. sect. ...	88

Y.

Yunnan and Java. On some	
new species of <i>Melania</i>	
and <i>Fullenia</i> from ...	51

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CONTENTS OF VOLUME XII.

	PAGE.
Descriptions of new species of Marine Shells from Ceylon. By H. B. PRESTON, F.Z.S. (Plates i and ii.)	1
Descriptions of two new species of <i>Diplommatina</i> from Ceylon. By H. B. PRESTON, F.Z.S. (Plate ii, figs. 39—40.)	9
Description of nine new species of Helicoid Land Shells. By G. K. GUDE, F.Z.S. (Plates iii and iv.)	11
Note on a variety of <i>Paludestrina jenkinsi</i> , E. A. Smith, By H. OVERTON. (Illustrations.)	15
Names of Ammonites. By T. D. A. COCKERELL.	16
Description of a new <i>Flammulina</i> from New Zealand. By HENRY SUTER. (Plate v.)	19
On <i>Chloritis</i> (<i>Austrochloritis</i>) <i>pelodes</i> , Pfr., and <i>pseudoprunum</i> , Pils. By HUGH C. FULTON	21
On <i>Drymaeus euryostomus</i> , Phil., and <i>hamadryas</i> , Phil. By HUGH C. FULTON	21
Description of new species of <i>Papuina</i> , <i>Planispira</i> (<i>Cristigibba</i>), <i>Strophocheilus</i> (<i>Borus</i>), and <i>Drymaeus</i> . By HUGH C. FUL- TON. (Plate vi.)	22
Note on three species of Pelecypods. By EDGAR A. SMITH, I.S.O.	26
Notes on a collection of Californian Nudibranchs. By PROFESSOR T. D. A. COCKERELL and SIR C. ELIOT, K C M G. (Plates vii and viii.)	31
The Genus <i>Cataulus</i> , with description of new forms. By E. R. SYKES, B.A. (Illustrations.)	54

Bionomical considerations in Gastropod Evolution. By PROFESSOR J. R. AINSWORTH DAVIS, M.A.	58
Supplement to the Revision of the New Zealand Polyplacophora, with Descriptions of New Species. (Plate ix.) By HENRY SUTER	65
A few Notes from the Antipodes. By HENRY SUTER.	72
On the Habitat and Food of <i>Helix desertorum</i> . By the REV. A. H. COOKE, M.A.	74
On the Anatomy of <i>Ensis (Solen) magnus</i> , Schumacher. By H. H. BLOOMER.	76
On the Anatomy of certain species of <i>Solenidae</i> . By H. H. BLOOMER. (Plate x.)	78
Anatomy of various species of <i>Solenidae</i> : Addenda et Corrigenda. By H. H. BLOOMER.	87
<i>Limnaea parva</i> . By PROFESSOR T. D. A. COCKERELL.	89
Current Literature.	16, 28, 64, 89
Editor's Notes.	18, 91

LIST OF ILLUSTRATIONS IN VOLUME XII.

	PAGE
New Marine Shells from Ceylon Plates I and II. . . .	10
Helicoid Land Shells. Plates III and IV. . . .	14
<i>Palulestrina jenkinsi</i> , E. A. SMITH, var. <i>aruleata</i>	15
<i>Flammulina (Thalassohelix) laingi</i> , n. sp. Plate V. . . .	20
New species of Land Shells. Plate VI. . . .	25
Californian Nudibranchs. Plates VII and VIII. . . .	53
<i>Cataulus smithi</i> , n. sp. 	56
<i>Cataulus prestoni</i> , n. sp. 	56
<i>Cataulus marginatus</i> var. <i>notata</i> , n. var. 	57
<i>Cataulus congener</i> , n. sp. 	57
New species of Polyplacophora. Plate IX. 	71
Anatomy of certain species of <i>Solenidae</i> . Plate X. . . .	85



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DESCRIPTIONS OF NEW SPECIES OF MARINE SHELLS
FROM CEYLON.

By H. B. PRESTON, F.Z.S.

(Plates i and ii.)

THE species forming the subject matter of the present paper were included in that portion of the collection of the late Mr. Hugh Nevill, which was secured by me after its recent disposal; this collection was especially rich in material from Ceylon, and I have every reason to believe that all the species now in question were collected in that island.

Tornatina tenuistriata, n. sp.

Pl. i, figs. 1—1a.

Shell elongate cylindrical, spire conical, semipellucid, white, protoconch sinistral and turned upon its side; whorls 3, exclusive of the protoconch, very finely spirally striate; suture deeply channelled; aperture elongate, narrow above, dilated at the base; peristome thin, somewhat contracted towards the centre, slightly expanding outwards at the base; columella descending in a curve and bearing a single plait.

Alt. 4. 5 millim.; diam. maj. 1.5. Aperture, alt. 3 millim.; diam. maj. .5.

Hab.—Ceylon.

Retusa serendibensis, n. sp.

Pl. i, fig. 2.

Shell cylindrical, semipellucid, marked longitudinally with somewhat opaque lines of growth, and finely spirally striate throughout; aperture curved, narrow above, dilated at the base; peristome rounded above and produced beyond the apex, slightly contracted in the middle; columella descending in a curve.

Alt. (including outer lip) 3 millim.; diam. maj. 1.25. Aperture, alt. 3 millim.; diam. maj. .5.

Hab.—Ceylon.

Clavatula gaylordae, n. sp.

Pl. i, fig. 3.

Shell fusiform, brown: whorls 9, the first three smooth, the remainder bearing coarse costae interrupted by spiral striae: the costae on the body whorl becoming obsolete below the periphery: sutural coronal well defined: aperture oval: peristome thin: columella slightly curved outwards.

Alt. 6 millim.; diam. maj. 2. Aperture, alt. 2 millim.; diam. .75.

Hab.—Ceylon.

Mangilia mangeri, n. sp.

Pl. i, fig. 4.

Shell slenderly fusiform, dirty white, stained with patches of pale brown, a broad band of the same colour appearing round the base of the shell: whorls 6, somewhat finely cancellated, the upper whorls bearing a central row of rather coarse tubercles: suture impressed: aperture elongate oblong oval: peristome thickened: columella rather straight.

Alt. 8.5 millim.; diam. maj. 3. Aperture, alt. 3 millim.; diam. 1.

Hab.—Ceylon.

Mangilia (Glyphostoma) cazioti, n. sp.

Pl. i, fig. 5.

Shell ovate fusiform, the upper whorls flesh colour, the two last white, a pale brown band appearing at the base of the body-whorl while the suture is also discoloured by a faint band of the same colour: whorls 5–6, sculptured with spiral striae and coarse, somewhat distant, transverse ribs which project above the suture: suture impressed: aperture narrow, oblique: peristome thickened and serrated by the spiral striae: columella descending obliquely.

Alt. 5 millim.; diam. maj. 2.25. Aperture, alt. 2 millim.; diam. .5.

Hab.—Ceylon.

Mangilia (Glyphostoma) ecolorata, n. sp.

Pl. i, fig. 6.

Shell oblong fusiform, white: whorls 6–7, shouldered, cancellate with coarse costae and spiral striae: suture well impressed: aperture curved, elongate: peristome thickened and serrated on the inner margin: columella curved.

Alt. 7.7 millim.; diam. maj. 2.5. Aperture, alt. 2.5 millim.; diam. .5.

Hab.—Ceylon.

Mangilia (Clathurella) carnicolor, n. sp.

Pl. i, fig. 7.

Shell ovate, white, bearing two broad flesh-coloured bands, one above, and one below the periphery: whorls 7, cancellated with fine costae crossed by spiral striae, the penultimate whorl rather swollen, the apical whorls acute: aperture oblong oval: peristome thickened and serrated by the spiral striae: columella descending in a slight curve.

Alt. 5 millim.; diam. maj. 2. Aperture, alt. 2 millim.; diam. .5.

Hab.—Ceylon.

This species somewhat recalls *C. bulleni*, Preston*, but is easily distinguished by the pale flesh-coloured bands and by its being much more finely sculptured than is the case with *C. bulleni*.

Mangilla (Cythara) brunneolineata, n. sp.

Pl. i, fig. 8

Shell ovate fusiform, yellowish-white, painted with fine thread-like pale reddish brown spiral lines, and bearing two blotches of the same colour on the body whorl, one just behind the sinus, and the other at the base of the outer lip; whorls 7-8, obliquely costate and finely spirally striate; suture well impressed; aperture narrow, elongate oval; peristome varicosely thickened; columella slightly curved.

Alt. 5 millim.; diam. maj. 2. Aperture, alt. 2 millim.; diam. .5.

Hab.—Ceylon.

Cancellaria exquisita, n. sp.

Pl. i, fig. 9.

Shell thin, ovately turreted, very narrowly perforate, pale reddish-brown, encircled just below the periphery by a white band; whorls 7-8, somewhat convex sculptured with coarse spiral and transverse striae, presenting a cancellated appearance and bearing occasional varices at irregular intervals, the apices of which are pure white and project above the suture; suture deeply channelled; aperture inversely auriform; peristome varicosely thickened; columella rather straight, three plaited and extending into a thin callosity which reaches the lip above.

Alt. 19 millim.; diam. maj. .9. Aperture, alt. 8 millim.; diam. 3.5.

Hab.—Ceylon.

Columbella (Mitrella) multistriata, n. sp.

Pl. i, fig. 10.

Shell fusiform, pale whitish; whorls 8-9, sculptured throughout with very fine spiral striae and with indistinct, transverse, undulating ridges which are slightly more distinct on the upper whorls; suture shallow and slightly crenulate; peristome somewhat varicosely thickened and expanded downwards towards the centre; columellar descending in a curve, a thick callosity joining it with the lip above; aperture elongately oval; canal short and rather broad.

Alt. 7.5 millim.; diam. maj. 2.75. Aperture, alt. 2 millim.; diam. .75.

Hab.—Ceylon.

Cerithium tomlini, n. sp.

Pl. i, figs. 11-11a.

Shell elongate fusiform, varicose, reddish brown throughout except the varices which are white; apex acute; whorls 10, rather convex, sculptured with transverse costae becoming obsolete on the last half of the body whorl and which are crossed by fine spiral striae; suture impressed; peristome thin; columellar straight; canal short and curved very slightly outwards; aperture oval.

* Journ. of Malac., 1904, vol. xi, p. 73.

Alt. 3.75 millim ; diam. maj. 1.25. Aperture, alt. .5 millim. ; diam. .25.

Hab.—Ceylon.

***Cerithiopsis abjecta*, n. sp.**

Pl. i, figs. 12—12a.

Shell elongate fusiform, light brown, a broad band of darker brown appearing below the suture, apex rather blunt ; whorls 8, somewhat flattened, sculptured with three spiral ridges intersected by deep transverse grooves giving the shell a beaded appearance ; suture impressed ; aperture rotundly ovate ; columella descending truncate below and extending into a callosity which reaches the lip above ; peristome simple.

Alt. 2 millim ; diam. maj. .75.

Hab.—Ceylon.

***Cerithiopsis brunneoflava*, n. sp.**

Pl. i, fig. 13.

Shell elongate turritiform, bright brownish yellow ; whorls 11—12, sculptured with three somewhat distant revolving lirae intersected by fine transverse striae presenting a coarsely punctate appearance ; suture impressed ; aperture rotundly ovate ; columella curved and truncate below.

Alt. 8 millim. ; diam. maj. 2.25. Aperture, alt. 1 millim. ; diam. .75.

Hab.—Ceylon.

***Cerithiopsis orientalis*, n. sp.**

Pl. i, figs. 14—14a.

Shell elongate, yellowish white ; whorls 14—15, sculptured with three closely set coarse spiral lirae, interrupted by transverse grooves giving the shell a beaded appearance ; suture deeply impressed ; aperture rotundly ovate ; columella descending in a slight curve, truncate below.

Alt. 8 millim. ; diam. maj. 1.75. Aperture, alt. .25 millim.

Hab.—Ceylon.

***Diala polita*, n. sp.**

Pl. i, fig. 15.

Shell elongate pyramidal, imperforate, thin, polished, yellowish ; whorls 8, the last spirally striate, the striae becoming much coarser below the periphery ; suture impressed ; peristome simple ; aperture oval.

Alt. 4.5 millim. ; diam. maj. 1.75. Aperture, alt. 1 millim.

Hab.—Ceylon.

***Diala semipellucida*, n. sp.**

Pl. i, fig. 16.

Shell elongate pyramidal, subperforate, shining white, somewhat pellucid, a narrow opaque white band appearing below the sutures ; whorls 8—9, rather flattened, sculptured throughout with very fine spiral striae, the last whorl keeled below the periphery ; suture impressed ; aperture oval ; peristome thin ; columella rather straight and extending into a callosity joining the lip above.

Alt. 5.5 millim. ; diam. maj. 2. Aperture, alt. 1.5 millim. ; diam. .5.
Hab.—Ceylon.

***Rissoina pellucida*, n. sp.**

Pl. i. fig. 17.

Shell ovately fusiform, imperforate, thin, white, transparent ; whorls 4—5, smooth, rather polished ; suture scarcely impressed ; peristome simple ; aperture oval.

Alt. 1.5 millim. ; diam. maj. .5.

Hab.—Ceylon.

***Rissoina delicatula*, n. sp.**

Pl. i, figs. 18—18a.

Shell elongate fusiform, white, whorls 7—8, sculptured with numerous very fine transverse costae gradually disappearing on the last half of the body whorl which is finely spirally striate ; suture linear ; peristome somewhat varicosely thickened ; columella slightly notched below ; aperture inversely auriform.

Alt. 6 millim. ; diam. maj. 2.25. Aperture, alt. 1.5 millim. ; diam. .75.

Hab.—Ceylon.

***Rissoina oseitans*, n. sp.**

Pl. i, figs. 19—19a.

Shell elongate subcylindrical, thin, transparent white ; whorls 6—7, very finely spirally striate ; suture impressed ; peristome slightly thickened ; aperture broad, dilated, ovate ; columella descending somewhat obliquely below and extending into a callosity which reaches the lip above.

Alt. 5.75 millim. ; diam. maj. 1.5. Aperture, alt. 1.5 millim. ; diam. .5.

Hab.—Ceylon.

***Rissoina (Rissolina) filicostata*, n. sp.**

Pl. i, fig. 20.

Shell elongate pyramidal, white, whorls 8—9, sculptured with somewhat fine oblique costae becoming obsolete on the last half of the body-whorl, and finely spirally striate throughout, the spiral striae becoming stonger in that region where the costae are obsolete ; suture impressed ; peristome varicosely thickened ; aperture oval ; columella notched and much twisted at the base.

Alt. 5.5 millim. ; diam. maj. 2. Aperture, alt. 2 millim. ; diam. .75.

Hab.—Ceylon.

***Rissoina (Morehiella) lankaensis*, n. sp.**

Pl. i. fig. 21.

Shell elongate fusiform, yellowish-white ; whorls 10, the first seven coarsely sculptured with spiral lirae crossed by transverse grooves, presenting a beaded appearance, the lower whorls smooth ; suture deeply impressed above, linear below ; peristome thickened interiorly ; columella slightly notched below ; aperture inversely auriform.

Alt. 10 millim. ; diam. maj. 3.5. Aperture, alt. 2 millim. ; diam. .75.

Hab.—Ceylon.

***Feneila purpureoapleata*, n. sp.**

Pl. i, fig. 22.

Shell elongate fusiform, yellowish-white, the apical whorls tinged with blackish

purple ; whorls 10, somewhat inflated, transversely costate, the costae becoming much weaker on the body whorl and only reaching to the periphery, spirally striate giving the shell a cancellated appearance ; suture impressed, crenulate ; peristome simple ; aperture oval.

Alt. 4 millim. ; diam. maj. 1.25. Aperture, alt. .5

Hab.—Ceylon.

***Eulima exasperata*, n. sp.**

Pl. ii, fig. 23.

Shell elongately fusiform, dirty-white ; somewhat pellucid ; whorls 10, smooth, shining, rather flat, the apical whorls slightly curved ; suture impressed ; peristome simple ; aperture oval.

Alt. 3 millim. ; diam. maj. 1. Aperture, alt. .5 millim.

Hab.—Ceylon.

***Eulima indica*, n. sp.**

Pl. i, fig. 24.

Shell elongate fusiform, very solid, smooth, polished, milky-white ; whorls 12, flattened ; suture impressed ; aperture oval ; columella curved.

Alt. 6 millim. ; diam. maj. 2. Aperture, alt. 1.5 millim. ; diam. 5.

Hab.—Ceylon.

***Pyramidella (Oscilla) mirabilis*, n. sp.**

Pl. ii, fig. 25.

Shell elongate fusiform, thin, dirty-white ; whorls 6 - 7, channelled, spirally lirate, the upper whorls bearing a thick, smooth, annular spiral ridge just below the suture and two coarse spiral lirae below this ridge ; suture impressed ; aperture oval ; peristome simple, curved inwards at the point where it reaches the channelled portion of the whorl ; columella somewhat arched and bearing a single plait.

Alt. 4 millim. ; diam. maj. 1.5. Aperture, alt. .5 millim.

Hab.—Galle, Ceylon.

***Pyramidella (Oscilla) suburbana*, n. sp.**

Pl. ii, fig. 26.

Shell elongate fusiform, pale brownish-yellow ; whorls 7 - 8, rather flattened, sculptured with three spiral lirae on the middle whorls increasing to seven on the body-whorl ; peristome simple ; aperture ovate ; columella arched and expanded outwards below, bearing a strong plait above.

Alt. 3.5 millim. ; diam. maj. 1.5. Aperture, alt. .5 millim.

Hab.—Kalpetti (a suburb of Colombo), Ceylon.

***Pyramidella (Mormula) humilis*, n. sp.**

Pl. ii, fig. 27.

Shell elongate fusiform, white ; whorls 8 - 9 somewhat coarsely transversely costate and spirally striate giving the shell a finely cancellated appearance ; suture impressed ; peristome simple ; aperture ovate ; columella twisted.

Alt. 4.75 millim. ; diam. maj. 1.5. Aperture, alt. .5 millim.

Hab.—Ceylon.

Pyramidella (Actaeopyramis) ceylanica, n. sp.

Pl. ii, figs. 28—28a.

Shell elongate, white, thin, transparent; whorls 10—11, rather flattened, sculptured with opaque coarse spiral striae and finely cancellated by very fine transverse striae; suture well impressed; peristome simple; aperture oval, somewhat elongated; columella plait oblique.

Alt. 10 millim.; diam. maj. 2.25. Aperture, alt. 2 millim.; diam. 1.

Hab.—Kandakulli, Ceylon.

Pyramidella (Actaeopyramis) sykesi, n. sp.

Pl. ii, fig. 29.

Shell elongate, tapering, transparent white; whorls 8—9, flattened, sculptured with fine spiral grooves intersected by very fine transverse striae giving the surface of the shell an almost punctate appearance; suture impressed; peristome thin; aperture elongate oval; columella slightly curved.

Alt. 6 millim.; diam. maj. 1.5. Aperture, alt. 1.5 millim.; diam. .5.

Hab.—Ceylon.

Pyramidella (Actaeopyramis) suavissima, n. sp.

Pl. ii, fig. 30.

Shell elongate cylindrical, thin, white; whorls 7, spirally striate and cancellated by very fine transverse striae; suture deep; peristome simple; aperture oval.

Alt. 3.5 millim.; diam. maj. 1.25. Aperture, alt. .5 millim.

Hab.—Kandakulli, Ceylon.

Turbonilla coeni, n. sp.

Pl. ii, fig. 31.

Shell elongate, thin, dirty-white; whorls 12—13, flattened, closely costate; suture impressed; peristome simple; aperture oval; columella straight.

Alt. 5 millim.; diam. maj. .75. Aperture, alt. .25 millim.

Hab.—Kandakulli, Ceylon.

Turbonilla sinhila, n. sp.

Pl. ii, figs. 32—32a.

Shell elongate, whitish; whorls 10, costate, the costae on the last whorl much finer and more numerous than on the whorls above; suture well impressed; peristome simple; aperture oval; columella descending obliquely.

Alt. 3.75 millim.; diam. maj. 1.

Hab.—Kandakulli, Ceylon.

Turbonilla (?) princeps, n. sp.

Pl. ii, fig. 33.

Shell elongate fusiform, bright yellow, ornamented with a rich reddish-brown band just below the suture, and appearing on the body-whorl well below the periphery; whorls 10—11, flattened, very finely costate and bearing traces

of microscopic spiral striae ; suture scarcely impressed ; aperture auriform ; columella fold fairly well developed.

Alt. 8 millim. ; diam. maj. 2.25. Aperture, alt. 1.5 millim. ; diam. .75.

Hab.—Ceylon.

***Gena ziezae*, n. sp.**

Pl. ii, figs. 34a—34d.

Shell haliotoid, oval, polished, yellowish-pink, painted with zigzag flame markings and blotches of reddish-brown, and bearing a regular line of oblong dark-brown blotches at the periphery ; whorls 3—4, sculptured with fine radiating lines of growth and spiral striae which become coarser at the base ; interior of shell iridescent, the spiral striae showing very plainly ; suture shallow ; peristome simple ; columella arcuate ; aperture oblong ovate.

Alt. 9 millim. ; diam. maj 5. Aperture, alt. 5.5 millim. ; diam. 4.

Hab.—Ceylon.

***Callista (Callocardia) birtsi*, n. sp.**

Pl. ii, fig. 35.

Shell rather thin, ovate, white, concentrically sculptured with fine regular striae ; extremities of umbones tinged with very pale pink ; anterior side produced ; posterior side somewhat obtuse.

Alt. 28 millim. ; length 34.5.

Hab.—Ceylon.

***Cultellus (Ensiculus) maculatus*, n. sp.**

Pl. ii, fig. 36.

Shell thin, elongated, strongly curved, pale flesh-colour, irregularly blotched and spotted with white, and covered with a thin, brown, periostracum ; anterior margin rounded and bent outwards ; posterior margin somewhat obtuse.

Alt. 11 millim. ; length 48.

Hab.—Ceylon.

***Gastrana (Metis) bridgmani*, n. sp.**

Pl. ii, fig. 37.

Shell white, oblong ovate, sculptured with fine, concentric, rather irregular striae ; left valve much depressed towards the centre, anteriorly flexuous ; right valve less depressed ; anterior side descending abruptly at an obtuse angle ; posterior side rather attenuated, rounded, umbones small.

Alt. 25 millim. ; length 29.5.

Hab.—Ceylon.

***Anatina smithi*, n. sp.**

Pl. ii, fig. 38.

Shell elongate, thin, yellowish-white, concentrically striated with somewhat irregular lines of growth ; anterior side slightly attenuated, rounded, gaping ; posterior side rounded, moderately gaping.

Alt. 20 millim. ; length 38.

Hab.—Ceylon.

**DESCRIPTIONS OF TWO NEW SPECIES OF
DIPLOMMATINA FROM CEYLON.**

By H. B. PRESTON, F.Z.S.

(Plate ii, figs. 39, 40).

***Diplommatica (Natica) lankaensis*, n. sp.**

Pl. ii, fig. 39.

Shell dextral, pyramidal, somewhat transparent, pale horn colour; whorls 8, rather coarsely spirally striate throughout, the penultimate whorl being narrower than the antepenultimate; suture impressed; umbilicus broad; peristome continuous, slightly reflexed, reddish-brown, irregular; aperture subcircular.

Alt. 3 millim.; diam. maj. 2. Aperture, alt. 1 millim.; diam. .75

Hab.—Kinidun, Ceylon.

***Diplommatica (Natica) delectabilis*, n. sp.**

Pl. ii, fig. 41.

Shell dextral, sub-ovate, pale horn colour; whorls 7, very finely spirally striate, the antepenultimate whorl much inflated, the body-whorl ascending gradually so as to finally cover the penultimate whorl just behind the peristome; suture impressed; umbilicus narrow; peristome continuous, thick, reflexed, reddish-brown, very irregular and projecting above at the point where it overlaps the penultimate whorl; aperture subcircular; columella straight.

Alt. 2 millim.; diam. maj. 1.25. Aperture, alt. .5 millim.

Hab.—Kinidun, Ceylon.

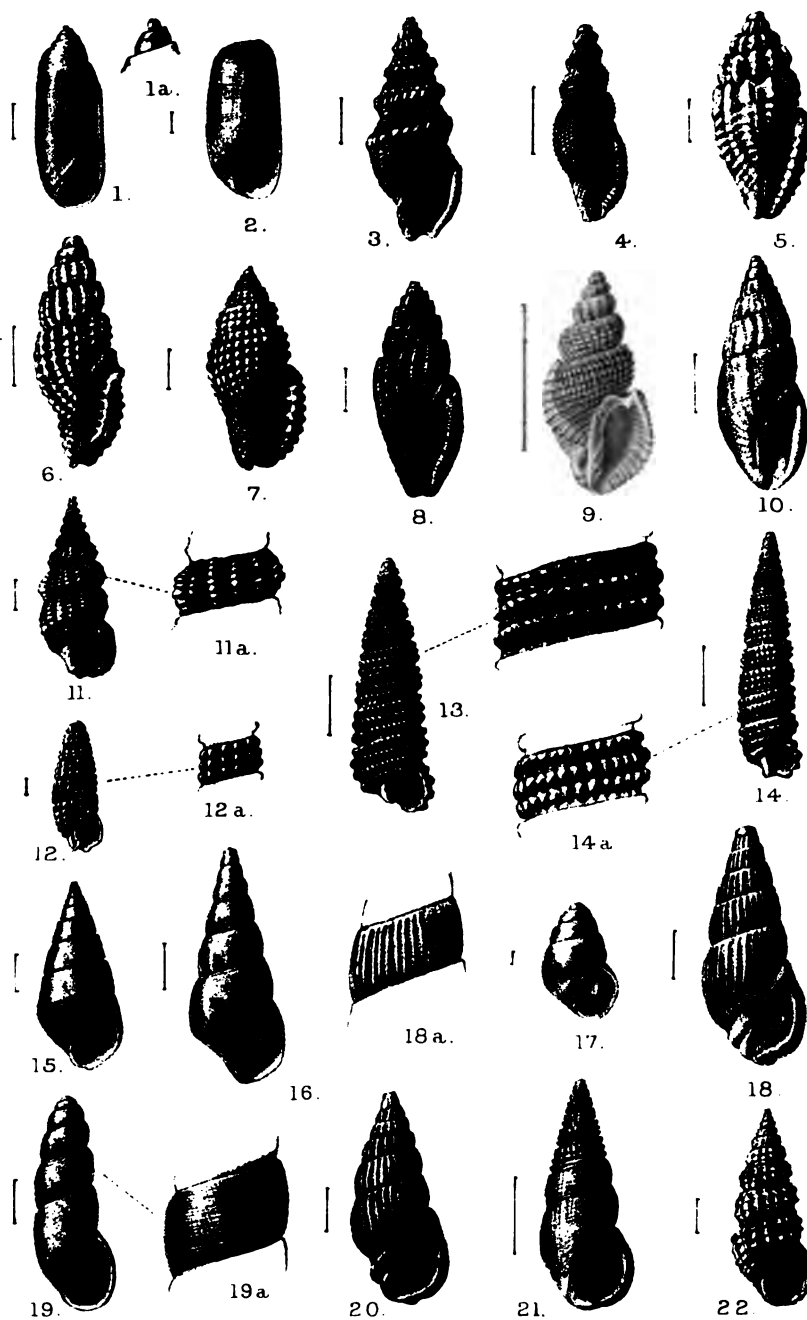
EXPLANATION OF PLATES I and II.

Plate I.

- Figs. 1—1a. *Tornatina tenuistriata*, n. sp.
 Fig. 2. *Retusa serendibensis*, n. sp.
 Fig. 3. *Clavatula gaylordae*, n. sp.
 Fig. 4. *Mangilia mangeri*, n. sp.
 Fig. 5. *Mangilia* (*Glyphostoma*) *cazioti*, n. sp.
 Fig. 6. *Mangilia* (*Glyphostoma*) *ecolorata*, n. sp.
 Fig. 7. *Mangilia* (*Clathurella*) *cornicolor*, n. sp.
 Fig. 8. *Mangilia* (*Cythara*) *brunneolucata*, n. sp.
 Fig. 9. *Cancellaria exquisita*, n. sp.
 Fig. 10. *Columbella* (*Mitrella*) *multistriata*, n. sp.
 Figs. 11—11a. *Cerithium tomlini*, n. sp.
 Figs. 12—12a. *Cerithiopsis abjecta*, n. sp.
 Fig. 13. *Cerithiopsis brunneo flavida*, n. sp.
 Figs. 14—14a. *Cerithiopsis orientalis*, n. sp.
 Fig. 15. *Diala folita*, n. sp.
 Fig. 16. *Diala semipellucida*, n. sp.
 Fig. 17. *Rissoia pellucida*, n. sp.
 Figs. 18—18a. *Rissoina delicatula*, n. sp.
 Figs. 19—19a. *Rissoina oscitans*, n. sp.
 Fig. 20. *Rissoina* (*Rissolina*) *filicostata*, n. sp.
 Fig. 21. *Rissoina* (*Morchella*) *lankaensis*, n. sp.
 Fig. 22. *Fenella purpureoapicla*, n. sp.

Plate II.

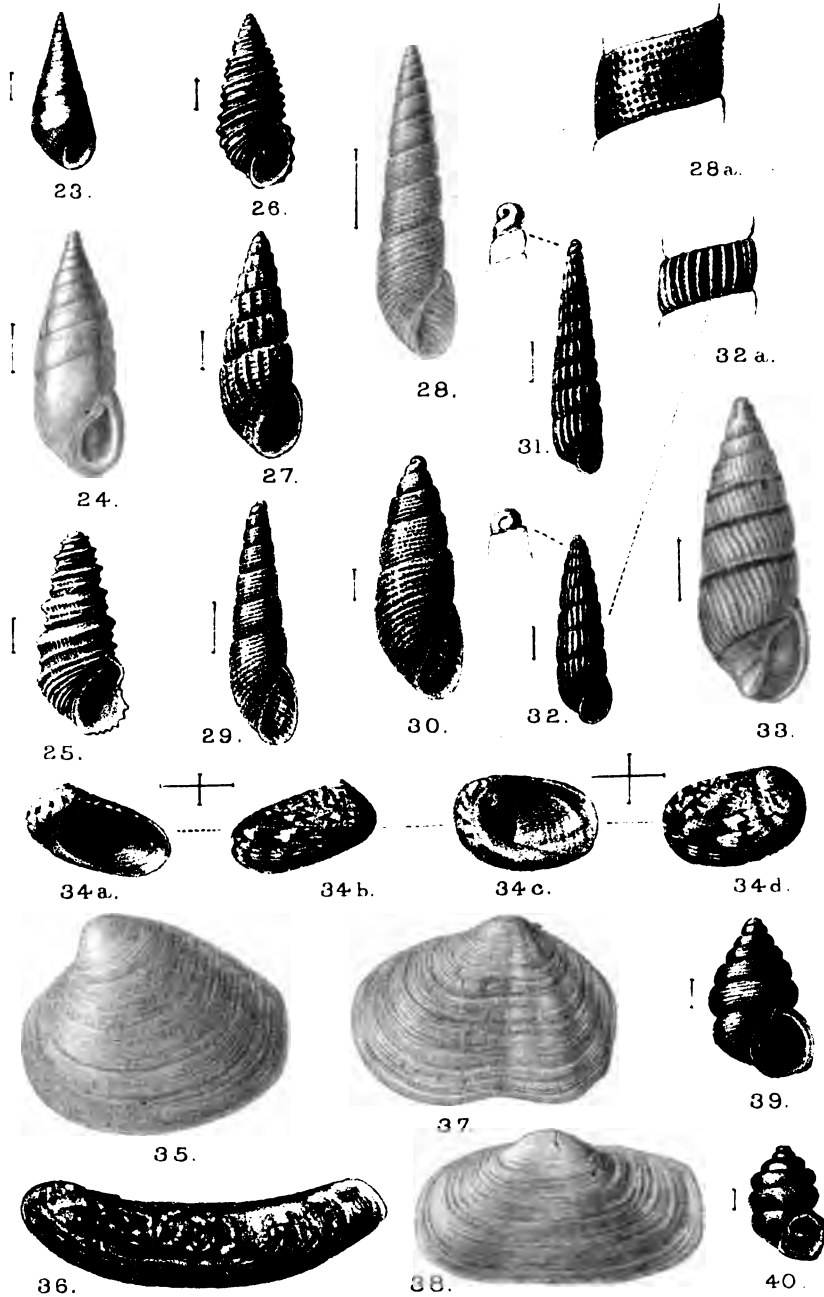
- Fig. 23. *Eulima exasperata*, n. sp.
 Fig. 24. *Eulima indica*, n. sp.
 Fig. 25. *Pyramidella* (*Oscilla*) *mirabilis*, n. sp.
 Fig. 26. *Pyramidella* (*Oscilla*) *suburbana*, n. sp.
 Fig. 27. *Pyramidella* (*Mormula*) *humilis*, n. sp.
 Figs. 28—28a. *Pyramidella* (*Actaeopyramis*) *ceylanica*, n. sp.
 Fig. 29. *Pyramidella* (*Actaeopyramis*) *sykesi*, n. sp.
 Fig. 30. *Pyramidella* (*Actaeopyramis*) *suavissima*, n. sp.
 Fig. 31. *Turbonilla coeni*, n. sp.
 Figs. 32—32a. *Turbonilla sinhila*, n. sp.
 Fig. 33. *Turbonilla* (?) *princeps*, n. sp.
 Figs. 34a—34d. *Gena ziczac*, n. sp.
 Fig. 35. *Callista* (*Callocardia*) *birtsi*, n. sp.
 Fig. 36. *Cultellus* (*Ensiculus*) *maculatus*, n. sp.
 Fig. 37. *Gastrana* (*Metis*) *bridgmani*, n. sp.
 Fig. 38. *Anatina smithi*, n. sp.
 Fig. 39. *Diplommatina* (*Nicida*) *lankaensis*, n. sp.
 Fig. 40. *Diplommatina* (*Nicida*) *delectabilis*, n. sp.



A. H. Searle, del et lith

A. S. Huth, imp

NEW MARINE SHELLS FROM CEYLON.



A. H. Searle, del et lith.

A. S. Huth, imp.

NEW MARINE SHELLS FROM CEYLON.



DESCRIPTION OF NINE NEW SPECIES OF HELICOID LAND SHELLS.

By G. K. GUDE, F.Z.S.

(Plates iii & iv.)

WHEN the first portion of Dr. J. C. Cox's collection of Shells came under the hammer last year, Mr. E. R. Sykes acquired *inter alia* about 50 boxes of small Helicoids (mostly from Polynesia) which he kindly entrusted to me for examination. The majority pertain to known species, but six appear to be undescribed, and another undescribed species was found, with a number of *Baillistes bednalli*, acquired by myself from the same source.

I avail myself of the opportunity afforded by the publication of descriptions of these new species to describe also (1) a *Chloritis* from Aru, of which a single specimen was recently sent to me by Miss Linter for identification, and which differs from any species as yet known; and (2) a new *Plectotropis* from Java received from Mr. Gerrard. Moreover, two species of *Cathaica* described by me in this Journal (vol. xi, p. 93) are likewise figured. When describing these species I unfortunately overlooked the fact that one of them (*C. sturanyi*) had already been published by Dr. Kobelt in Rossmassler Iconographic, New Series (1893), VI. p. 75, pl. 169, fig. 1086.

***Sitala pudica*, n. sp.**

Pl. iii, figs. 3a—3b.

Shell perforate, conoid, smooth, a little shining, pellucid, thin, corneous; spire convex, suture impressed, apex obtuse; whorls 4, a little convex, increasing slowly; last whorl not descending in front, angulated at the periphery, tumid below. Aperture scarcely oblique, roundly lunate; peristome thin, straight, acute; margins distant, columellar margin slightly dilated and overhanging the narrow perforation of the umbilicus.

Diam. 2 millim.; alt. 1.5.

Hab.—Cape Byron, Byron Bay, New South Wales.

Type in Mr. Sykes' collection.

Allied to *Sitala sublimis*, Hedley, which, however is more rounded at the periphery. It also resembles *S. starki*, Brug., but that species is more sculptured above. Several shells were found to contain a number of young.

***Thalassia cookensis*, n. sp.**

Pl. iii, figs. 4a—4b.

Shell umbilicated, conoid, finely striated, smoother and shining below, pellucid, pale corneous, spire depressed, suture margined, apex obtuse. Whorls 5, convex, increasing slowly, last whorl not descending in front, slightly flattened below, rounded at the periphery. Aperture oblique, semilunate; peristome thin, straight, acute; margins approaching, upper and outer arcuate, columellar ascending, slightly dilated over the moderate umbilicus.

Diam. 4.5 millim.; alt. 2.5.

Hab.—Aitutake, Cooks Islands. (Garrett).

Type in Mr. Sykes' collection.

***Thalassia cyrtochila*, n. sp.**

Pl. iii, figs. 2a—2b.

Shell umbilicate, depressed, conoid, very finely arcuately striated, densely covered by excessively minute spiral lines, giving the shell a silky lustre, a little more shining below, amber coloured. Spire depressed, suture margined, apex obtuse. Whorls 4—4½, a little convex, increasing slowly and regularly at first, the last rather suddenly, and dilated at the mouth, not descending in front, rounded at the periphery, convex below, swelling towards the mouth. Aperture a little oblique, roundly lunate, margins approaching; peristome thin, straight, acute, columellar margin arcuate, dilated, slightly overhanging the moderate umbilicus.

Diam maj. 9 millim., min. 7.5; alt. 5.5.

Hab.—Long Reef, South Australia.With *Badistes bednalli*. Type in my collection.

Allied to *Thalassia villaris*, Pfr., but more elevated, more rounded at the periphery and more swollen at the base.

***Trochonanina sykesi*, n. sp.**

Pl. iv, figs. 7a—7b.

Shell imperforate, finely striated, smooth, shining, pale, more or less radiately streaked transversely and covered above with crowded spiral opaque creamy lines which become sparser and darker below. Spire convex, suture linear becoming crenulate at the last whorl, apex obtuse. Whorls 5, flattened, increasing slowly and regularly, last whorl not descending in front, bluntly keeled at the periphery, convex below, excavated at the umbilical region. Aperture a little oblique, securiform; margins distant; peristome thin straight acute, columellar almost vertical, thickened, slightly dilated, white.

Diam. maj. 8.5 millim., minor 8; alt. 6.

Hab.—Marquesas. (Garrett 1879).

Type in Mr. Sykes' collection.

Allied to *T. subrutula*, Pfr., and *chamissoi*, Pfr., but more elevated in the spire than either. The keeled periphery and the vertical columellar margin further separate it from *T. chamissoi*.

***Charopa lifuana*, n. sp.**

Pl. iv, figs. 6a—6c.

Shell umbilicated, discoid, finely ribbed, fuscous, opaque, solid, spire flattened, suture rather deep. Whorls 5, increasing slowly, convex above, rounded at the periphery, tumid below, obtusely angulated round the wide umbilicus. Aperture scarcely oblique, subrotundate, margins approaching; peristome straight, acute, sinuous; upper margin arcuate, columellar receding over the umbilicus, not dilated.

Diam. 3.5 millim.; alt. 1.5.

Hab.—Lifu, Loyalty group.

Type in M. Sykes' collection.

Allied to *C. vetula*, Gass., but it possesses a wider umbilicus.

Charopa ochracea, n. sp.

Pl. iv, figs. 8a—8c.

Shell umbilicated, lenticular, finely ribbed, pale ochreous, opaque, rather thin. Whorls $4\frac{1}{2}$, convex above, subangulated at the periphery, rounded below, spire flattened, suture channelled. Aperture a little oblique, subauriculate, margins approaching; peristome straight, acute; upper margin a little inflected, columellar arcuate, slightly dilated; umbilicus perspective.

Diam. 2.5 millim.; alt. 8.

Hab.—Artillery Point, New Caledonia.

Type in Mr. Sykes' collection.

Endodonta (Hauatodon) quadridens, n. sp.

Pl. iv, figs. 9a—9d.

Shell umbilicate, lenticular, fulvous corneous, finely striated, thin, translucent. Spire depressed, suture deep, apex obtuse. Whorls 4, convex, rounded at the periphery, last whorl not descending in front. Aperture scarcely oblique, semilunate, margins convergent, united by a thin callus; peristome scarcely thickened, columellar margin slightly dilated. Within the aperture occur on the parietal wall two slender entering lamellae, at first parallel, but becoming anteriorly elevated and divergent; on the parietal wall near the peristome four denticles: two on the outer margin, the first thin and conical, the second flattened semicircular, parallel with the peristome; one on the basal margin, thin, conical; one on the columellar margin, flattened semicircular and also parallel with the peristome. Umbilicus moderate, showing three-quarters of the penultimate whorl.

Diam. 1.5 millim.; alt. 0.5.

Hab.—Artillery Point, New Caledonia.

Type in Mr. Sykes' collection.

The nearest ally is *E. derbesiana*, Crosse, but that species has one broad tooth on the columellar margin and four conical denticles on the basal and outer margins.

Chloritis linterae, n. sp.

Pl. iii, figs. 5a—5d.

Shell widely umbilicate, dark rufous above, lighter below. Spire plain, apex sunken, suture channelled. Whorls $4\frac{3}{4}$, the first $2\frac{3}{4}$ increasing slowly, the last widening rather suddenly and slightly dilated at the mouth, obscurely angulated above, tumid below, obscurely angulated round the latter half of the wide umbilicus, which is steeply sloping near the mouth; finely striated under a deciduous cuticle, densely covered with short stiff bristles, arranged in quincunx. Last whorl deeply descending in front. Aperture semiquadrate; peristome thickened and reflexed, margins slightly convergent and united by a thin callus; upper margin angularly curved, fuscous, ascending shortly at first, then descending, outer margin also fuscous, rounded; columellar whitish, straight, dilated and slightly overhanging the umbilicus.

Diam. maj. 30 millim. ; min. 24 : alt. 19.

Hab. —Aru.

Type in Miss Linter's collection.

This new species is allied to *C. diadromomorpha*, Tapp., but it is higher in the axis, the aperture is less dilated transversely, the last whorl descends more deeply, and the umbilicus is considerably wider. The absence of spiral grooves, and the angulated sutural channel further distinguishes it from that species. The rows of bristles are also placed at a different angle. Figures 5a–5c exhibit the shell in three different positions, while figure 5d shows the periostracum enlarged.

***Plectotropis leucochila*, n. sp.**

Pl. iii, figs. 1a–1c.

Shell umbilicated, depressed conoid, rather thin, dull corneous, becoming whitish near the mouth and below; finely striated and decussated with crowded wavy spiral striae under a deciduous cuticle, which is densely covered with transverse rows of elongated raised scales. Spire conoid, suture impressed, apex obtuse. Whorls $5\frac{1}{2}$ – $5\frac{3}{4}$, convex above, tumid below; the last a little dilated towards the mouth and shortly descending in front, obtusely angulated at the periphery and round the widely perspective umbilicus. Aperture subcircular, oblique, margins convergent; peristome white, polished, thickened and reflected; columellar margin dilated, slightly overhanging the umbilicus.

Diam. maj. 16 millim., minor 13.5; alt. 8.5.

Hab.—Java.

Type in my collection.

In shape the present species resembles *P. sumatrana*, Mart., but that shell is much smaller, has an acutely keeled periphery and exceedingly minute scales. From *P. rotatoria*, Busch., it differs by the more depressed spire, more rounded periphery, more reflected peristome and by the umbilicus being more widened near the mouth, showing more of the penultimate whorl. A second specimen is darker than the type and measures: diam. maj. 17.5, min. 15; alt. 9.5 millim.

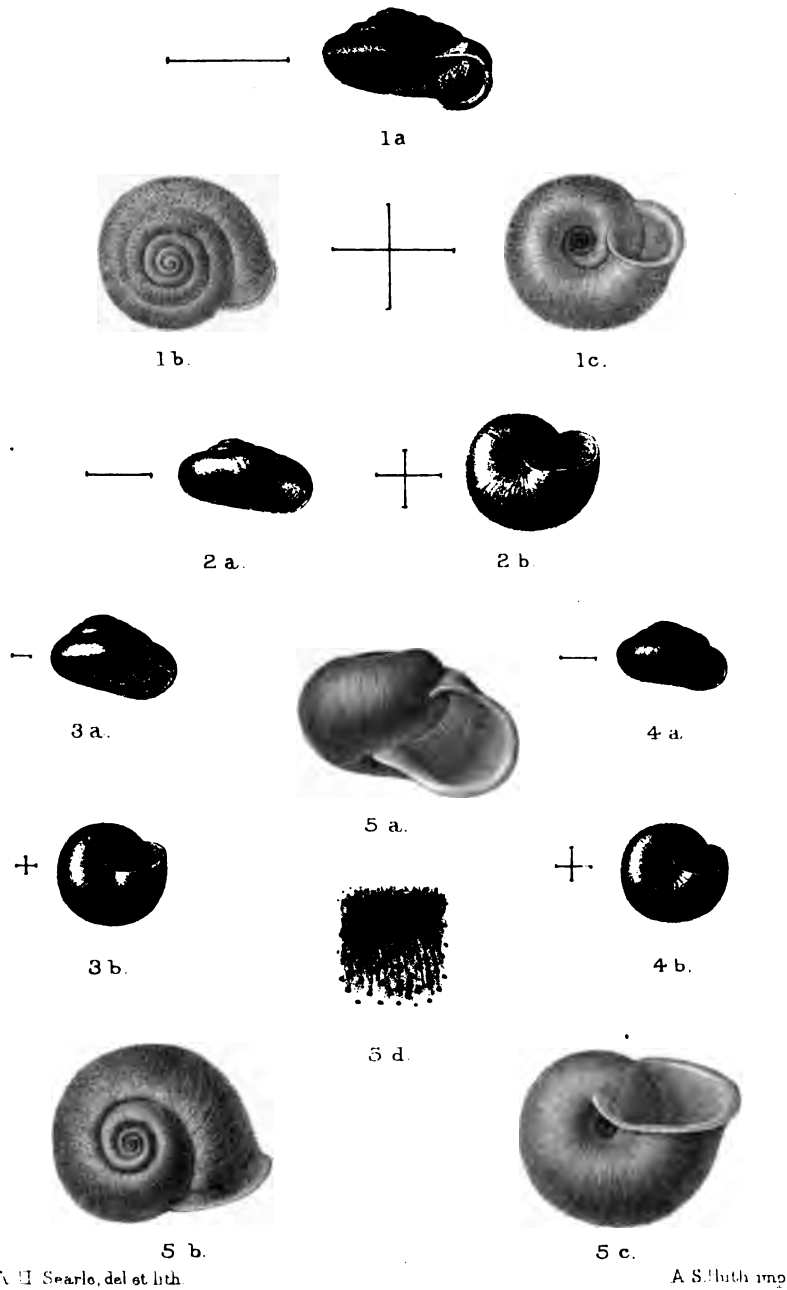
EXPLANATION OF PLATES III & IV.

Plate iii.

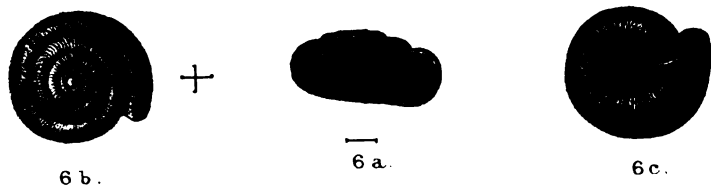
- Figs. 1a, 1c. *Plectotropis leucochila*, n. sp.
 Figs. 2a, 2b. *Thalassia cyrtochila*, n. sp.
 Figs. 3a, 3b. *Silala pudica*, n. sp.
 Figs. 4a, 4b. *Thalassia cookensis*, n. sp.
 Figs. 5a–5d. *Chloritis linterae*, n. sp.

Plate iv.

- Figs. 6a–6c. *Charopa lifuana*, n. sp.
 Figs. 7a, 7b. *Trochonanina sykesi*, n. sp.
 Figs. 8a–8c. *Charopa ochracea*, n. sp.
 Figs. 9a–9d. *Endodonta (Thaumatodon) quadridens*, n. sp.
 Figs. 10a–10c. *Cathaica hermanni*, (Mildf.), Gude.
 Figs. 11a–11c. *Cathaica sturanyana* (Rolle), Kob.



HELICOID LAND SHELLS.



6 b.

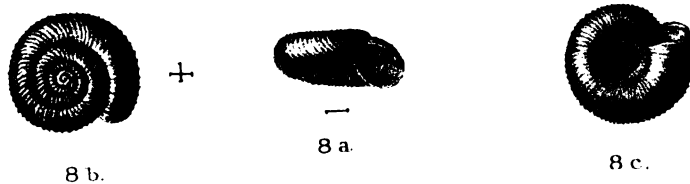
6 a.

6 c.



7 a.

7 b.



8 b.

8 a.

8 c.

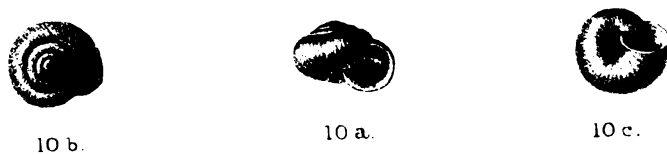


9 b.

9 a.

9 d.

9 c.



10 b.

10 a.

10 c.



11 b.

11 a.

11 c.

A. H. Searle, del et lith

A. S. Henshaw, imp

HELICOID LAND SHELLS.

**NOTE ON A VARIETY OF PALUDESTRINA JENKINSI,
E. A. SMITH.**

By H. OVERTON,
Sutton Coldfield.

THE shell here figured was collected by me some short time ago with other specimens of *P. jenkinsi*, E. A. Smith, many of which of were the keeled form, from the canal at Muckley Corner, near Wall, Staffordshire.

As will be seen from the figures there are a number of minute spikes irregularly distributed around the keel of the different whorls. In size and practically in all the other characters the shell is typical.

If no such variety has hitherto been described I would suggest the name *aruleata*, var. nov.

I am more interested, however, in learning something as to the probable cause which gave rise to this very striking peculiarity, and should esteem the opinion of other Malacologists who are interested in the members of this genus.



Paludestrina jenkinsi, E. A. Smith.

NOTES.

Names of Ammonites.—Several preoccupied generic names have lately been proposed for ammonites, as follows :—

- (1.) *Platytes*, Mojsisovics, Abh. Geol. Reichsanst., vi, Abth. 1, p. 332, not of Guenée, 1845; this may be called *Protoplatytes*, type *P. neglectus* (*Platytes neglectus*, Mojs.).
- (2.) *Canavaria*, Buckman, Emend. Ammonite Nomencl., 1902, not of Oppenheim, 1899; this has been changed by Cossmann to *Canavariceras*.
- (3.) *Walkeria*, Buckman, *t.c.*, not of Desvoidy, 1863, etc.
- (4.) *Braunsia*, Buckman, *t.c.*, not of Kriechbaumer, 1894.
- (5.) *Deltoceras*, Buckman, *t.c.*, not of Hyatt, 1894.

T. D. A. COCKERELL.

CURRENT LITERATURE.

Pilsbry, H. A.—Manual of Conchology, ser. ii, vol. xvii (pt. 66), pp. 65—112, pls. 11—23. Philadelphia: Academy of Natural Sciences.

Continuing the account of the genus *Achatina*, Lamarck, the sub-genus *Leptocala*, Ancy, is dealt with, also the genera *Cochlitoma*, Fér., Pilsbry, and *Archachatina* (Alb.), Pilsbry.

Fleure, H. J.—On the Evolution of Topographical Relations among the Docoglossa. Trans. Linn. Soc. Lond., 1904, vol. ix, pp. 269—290, pls. 15—17.

The affinities of the Docoglossa are difficult to trace on account of the antiquity of the group. Dr. Fleure, however, after a valuable study of the group, comes to the conclusion that we are only justified in hinting that they and the *Bellerophonitacea* are two of the earliest off-shoots from the Gastropod stem.

In this paper the common ancestor of the Prosobranch Gastropods; the foot and edge of shell, visceral hump, branchial cavity and heart, and consolidation of the visceral mass in the Docoglossa are discussed, and a valuable summary of Docoglossan evolution and affinities given.

Fleure, H. J.—Zur Anatomie und Phylogenie von *Halotis*. Jena. Zeitschr., 1904, Bd. xxxix, pp. 245—322, Tfn. ix—xiv.

Simroth, H.—Ueber die von Herrn Dr. Mrázek in Montenegro gesammelten Nacktschnecken unter Hinzunahme verwandten Materials. Sitzber. Gesell. naturwiss. Prag, 1904, No. 26, pp. 1—25, 1 Tf.

The new species, are: *Limax corcyrensis*, *L. mrazeki*, and *Agriolimax attemsi*.

Murdoch, R.—On the Anatomy of *Paryphanta fumosa*, Tenison-Woods. Trans. N. Z. Inst., 1904, vol. xxxvi, pp. 156—191, pl. vi.

The specimen upon which the author worked was collected at Mount Farrell, north-west Tasmania, and is one of the rarest members of the genus. Its general anatomy does not appear to present any important differences, except in the form of attachment of the buccal-mass retractor.

Nierstrasz, H. F.—Die Chitonen der Siboga-Expedition. Siboga-Expeditie, Monog. xlviii, 1905, pp. 1—114, Tfn. i—viii.

Dr. Nierstrasz in describing the Chitons of this Expedition has confined himself to the systematic side, and a description of the morphology of the shell. That the work is well done the author's name is a sufficient guarantee.

The new genera, species, etc., are :

<i>Lepidopleurus giganteus.</i>	<i>Acanthochites intermedius.</i>
<i>Lepidopleurus simplex.</i>	<i>A. (Notoplax) rubromaculatus.</i>
<i>Lepidopleurus rissoi.</i>	<i>A. (Notoplax) unicus.</i>
<i>Lepidopleurus lineatus.</i>	<i>A. (Loboplax) holosericeus.</i>
<i>Lepidopleurus planus.</i>	<i>A. (Cryptoconchus) burrowi.</i>
<i>L. (Pilsbryella, n. sect.) setiger.</i>	<i>Chiton speciosus.</i>
<i>Ischnochiton variegatus.</i>	<i>Chiton imbricatus.</i>
<i>Callochiton sulcatus.</i>	<i>Chiton reticulatus.</i>
<i>Callistochiton carpenteri.</i>	<i>Tonicia sowerbyi.</i>
<i>Craspedochiton tessellatus.</i>	<i>Tonicia variegata.</i>
<i>Squamophora oviformis, gen. et sp. nov.</i>	<i>Tonicia reticulata.</i>
<i>Leptoplax varius.</i>	<i>Tonicia lydemani.</i>
<i>Acanthochites biformis.</i>	<i>Squamopleura imitator, gen. et sp. nov.</i>

Suter, Henry.—New Land-Shell from New Zealand. Proc. Malac. Soc. Lond., 1904, vol. vi, pp. 155—157, figs. 1—6.

The new species are *Rhytida duplicata*, and *Eudodonta (Charopa) transenna*. A sinistral specimen of *Laoma moellendorffi* is also recorded, and a new sub-species (*lepada*) of *Realia turriculata*, Pfr.

Dautzenberg, Ph.—Observation sur le genre *Vaucheria*, Pallary. Bull. Soc. Zool. France, 1904, t. xxix, p. 211.

According to M. Bavay the shell for which M. Pallary constituted the new genus *Vaucheria*, is only a calcareous plate, the tergum, of the Cirripede *Pollicipes cornucopia*, Leach.

Jensen, Ad. S.—Studier over nordiske Mollusker. iii. Tellina (*Macoma*). N.E. Vidensk. Meddel. Kbhvn., 1905, pp. 21—52, T. 1.

Jensen, Ad. S.—*Pecten frigidus*, nomen Pecteni profundorum maris polaris incolae novum datum. Ibid., 1904, pp. 305—311, 2 figs.

Wilson, E. B.—Experimental Studies in Germinal Localization. ii. Experiments the Cleavage-Mosaic in *Patella* and *Dentalium*. Journ. exper. Zool., 1904, vol. i, pp. 197—261, 118 figs.

Glaser, O. C.—Excretory Activities in the Nuclei of Gastropod Embryos. Amer. Nat., 1904, vol. 38, pp. 513—519, 2 figs.

Baker, F. C.—Spire Variation in *Pyramidula alternata*. Ibid., pp. 661—668, 4 figs.

Jensen, C. A. & Sell, C.—Beiträge der Molluskenfauna Dänemarks. Nachr. Deutsch. Malak. Gesell., 1904, pp. 117—123.

Casteel, D. B.—The Cell-Lineage and Early Larval Development of *Fiona marina*, a nudibranch; Mollusk. Proc. Ac. Nat. Sci. Philad., 1904, vol. lvi, pp. 325—405, pls. xxi—xxxv.

Gulick, A.—The Fossil Land Shells of Bermuda. Ibid., pp. 406—425, pl. xxxvi.

Pilsbry, H. A. & Vanatta, E. G.—On certain Rhachiglossate Gastropoda eliminated from the *Aquillidae*. Ibid., pp. 591—595, figs. 1—5.

Pilsbry, H. A.—New Japanese Marine Mollusca : Pelecypoda. Ibid., pp. 550—561, pls. xxxix—xli.

Dautzenberg, Ph. et Bavay, A.—Description d'un *Amussium* nouveau dragué par le Siboga dans la mer de Celebes. Journ. de Conchyl., 1904, vol. lii, pp. 207—211, fig.

Dautzenberg, Ph.—Variations et cas teratologiques chez le *Murex brandaris*, Linné. Ibid., pp. 285—287, pl. viii.

Cockerell, T. D. A.—Note on the Nomenclature of the Snails usually called *Pupa*. Naut., 1905, vol. xviii, pp. 103, 104.

Pilsbry, H. A.—Notes on the Nomenclature of *Pupillidae*, Ibid., pp. 105—107.

Pilsbry, Henry A.—New *Clausiliidae* of the Japanese Empire.—x. Proc. Ac. Nat. Sci. Philad., 1904, pp. 809—838, pls. lii—lvii.

In this, the tenth article upon Japanese *Clausiliidae* Dr. Pilsbry describes a series of specialised forms from the Ryukyu Islands and Satsuma and its islands. As a whole they are more specialised than those of either China or Japan, and bear out the proposition the author has elsewhere advanced, that insular faunas age more rapidly than those of larger or continental areas.

There are six new sections described, twenty-four new species, nine sub-species, and one variety.

EDITOR'S NOTES.

During the year 1905 the science of Malacology has been robbed of two distinguished students in the persons of Dr. Eduard von Martens, of Berlin, and D. F. Heynemann, of Frankfort on Main. Scarcely had the New Year entered than we received the sad news of the death of Professor G. B. Howes, a past President of the London Malacological Society.

There are few zoologists who have not at some time or other sought Professor Howes' aid or advice, and his removal will leave a blank which will not easily be filled.

THE
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No. 2.

JUNE 29TH, 1905.

VOL. XII.

DESCRIPTION OF A NEW FLAMMULINA FROM
NEW ZEALAND.

By HENRY SUTER.

(Plate v.)

Flammulina (Thalassohelix) laingi, n. sp.

Pl. v, figs. 1—8.

Shell (figs. 1—3) globosely depressed, semitransparent, smooth, imperforate, with very fine close set lines of growth, which are crossed by numerous microscopic spiral lirae, more distinctly visible on the base. The colour is rufous-horny, whitish round the umbilical region. The epidermis is thin, slightly shining. Spire but little elevated, conoidal; the pullus consists of $1\frac{1}{2}$ obtuse whorls, which are very faintly radiately striate, and show indistinct microscopic spiral lines. Whorls 4, the last rapidly increasing, they are flatly convex, broadly rounded at the periphery and slightly impressed in the centre of the base. Suture impressed. Aperture oblique, broadly lunately oval. Peristome simple, straight, outer lip rounded, basal margin and inner lip slightly arched, the latter is strongly callous above and reflexed over the umbilical region, a broad thin callus unites the converging margins. There is no umbilicus, not even in the young stage.

Diam. maj. 14, min. 11.5; height 9 millim.

Hab.—One adult specimen, containing the animal, and a young empty shell were found on Longwood Range near Otautau, Southland, New Zealand, and kindly presented to me by Mr. Rob. M. Iaing, M.A., B.Sc., of Christchurch, and I have much pleasure in uniting his name with the species.

Type in my collection.

This very handsome shell is most nearly allied to our *Flammulina* (*s. str.*) *compressivoluta*, Reeve, and also to *F. (Thalassohelix) fordei*, Brazier, from Tasmania, both of which, however, are about one-third smaller. It is

the only imperforate species of the sub-genus *Thalassohelix* I know. The animal is of a yellowish brown colour, with a black band and spots on the mantle, distinctly visible through the shell on its periphery. The caudal pore (Fig. 4) is very distinct in this species, and is surrounded by a number of roundish papillae. The jaw (Fig. 5) is arcuate, thin and fragile, composed of exceedingly fine vertical lamellae. The radula (Fig. 6) is tongue-shaped, composed of many, about 100, transverse rows of teeth which have the formula 28—7—1—7—28. The rhachidian tooth has a mesocone extending a little beyond the base, and two minute ectocones. The lateral teeth are very similar to the rhachidian; the transition teeth show the entocone and mesocone fused together into one, a small ectocone being left. The marginals have apparently only the mesocone left, and there is on most teeth a minute ectocone present, which sometimes is split up into two. This dentition is that characteristic of the sub-genus *Thalassohelix*, in which, however, the ectocones of the rhachidian tooth are mostly obsolete and the marginals with a mesocone only.

The digestive and reproductive organs (Figs. 7—8) are those we usually find in *Flammulina*, *Entolonta* and *Luoma*. The salivary glands are fused together and the stomach is rather large. The vas deferens enters the distal end of the penis sac exactly at the place where the retractor muscle is affixed; the penis is covered with rugosities of irregular shape.

REFERENCE LETTERS.

<i>b.c.</i> Buccal mass.	<i>r.s.</i> Receptaculum seminis.
<i>di. gl.</i> Digestive gland.	<i>s.d.</i> Salivary duct.
<i>int.</i> Intestine.	<i>s. gl.</i> Salivary gland.
<i>p.</i> Penis.	<i>st.</i> Stomach.
<i>r.</i> Rectum.	<i>v.d.</i> Vas deferens.
<i>r.m.</i> Retractor muscle.	

EXPLANATION OF PLATE V.

- Figs. 1, 3. Shell of *Flammulina laingi*, n. sp.
 Fig. 4. Caudal pore, magnified.
 Fig. 5. Jaw, greatly magnified.
 Fig. 6. Teeth of Radula, x 240.
 Fig. 7. Digestive organs, magnified.
 Fig. 8. Reproductive organs (part only), magnified.



1.



2. f.



3.



5.



R.



6.



14.



22.

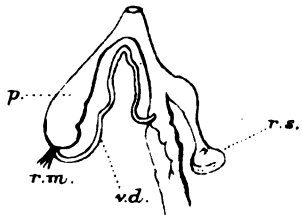


34.

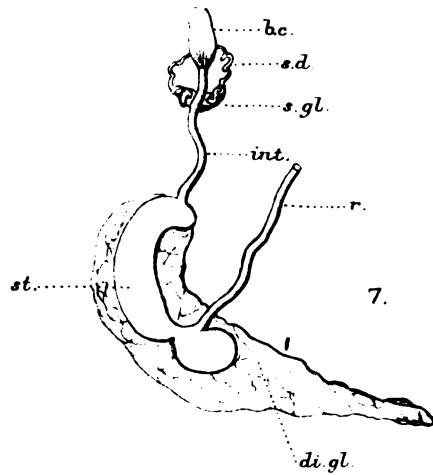
6.



4.



8.



7.

H S., del at nat.

Huth,Lith^r London

FLAMMULINA (THALOSSOHELIX) LAINGI, N.SP.

**ON CHLORITIS (AUSTROCHLORITIS) PELODES,
PFR., AND PSEUDOPRUNUM, PILS.**

BY HUGH C. FULTON.

In Vol. viii, p. 271, pl. 55. figs. 13—15. of the "Manual of Conchology," Dr. Pilsbry describes and gives the name of *pseudoprimum* to the form identified by authors as *primum*, Fér., which form is, no doubt, as Pilsbry suggests, a species of *Badistes*. After the description Pilsbry adds a note:—"This form might be referred to *H. pelodes* Pfr., were it not for the fact that the colour and measurements given by Pfeiffer do not correspond with it."

Having examined the type specimen of *H. pelodes* in the British Museum, I have no hesitation in saying that it is the same form as *pseudoprimum*, Pils.

With regard to the measurements, the species varies, some specimens being more globular than others, and as to colour, I can quite understand some describing the shell as reddish-brown, (Pfeiffer puts it "rubello-fusca") or as light-brown, as Pilsbry puts it, others might term it a dirty-white colour.

**ON DRYMAEUS EURYOSTOMUS, PHIL., AND
HAMADRYAS, PHIL.**

BY HUGH C. FULTON.

The British Museum has recently acquired a fine series of specimens from Chanchamayo, Peru, which show that the above species are one and the same.

D. euryostomus differs only in coloration from *hamadryas*, the former being of a uniform creamy-white colour, whilst *hamadryas* has the same ground colour, but is ornamented with irregular brown stripes. Judging from the series in the British Museum, this species varies greatly in coloration, much in the same way as *membrulinus*, Cr., and *cognata*, Pils. Mr Edgar A. Smith, I.S.O., and Mr. S. I. Da Costa also agree as to the identity of the two forms in question. Both were described in the Malak Blatt., 1867, xiv. p. 68., but the name *euryostomus* appears first on the page.

DESCRIPTIONS OF NEW SPECIES OF PAPUINA,
PLANISPIRA (CRISTIGIBBA), STROPHOCHEILUS
(BORUS), AND DRYMAEUS.

BY HUGH C. FULTON.

(Plate vi.)

Papuina liliium, n. sp.

Pl. vi, fig. 4.

= *xanthochila* var. Cox: P.Z.S., 1873, p. 567, pl. 48, fig. 7; Tryon's
Man. of Conch., vol. vii, p. 15, pl. 9, fig. 69.

This shell, although it bears a general resemblance to *xanthochila*, Pfr., is quite distinct. It differs from that species in the following respects:—it has one whorl less ($5\frac{1}{2}$), the whole shell is broader in proportion to its height, the peristome is pure white, much more widely expanded, and is strongly scored or crenulated behind.

Maj. diam. 31, alt. 42 millim.

Hab.—Solomon Islands. (ex coll. Dr. J. C. Cox).

Papuina (Dendrotrochus) pumila, n. sp.

Pl. vi, fig. 5

Shell trochiform, imperforate, rather thin, covered with a slight yellowish-green epidermis, white beneath, suture thread-margined; whorls 5, convex, the last acutely carinated at the periphery, swollen and then constricted just before its termination, not descending; aperture sub-ovate, glassy-white within; peristome very oblique, thin and scarcely expanded at right margin, but somewhat thickened and expanded at the basal portion, slightly decreasing in width towards point of insertion.

Maj. diam. 13, alt. 9 millim.

Hab. - New Ireland.

In its general character, especially in having the constriction at rear of aperture, similar to *pyris*, Hinds, but quite distinct by its different form (*pyris* being almost as high as it is broad), its larger size and non-descending last whorl.

Papuina suprapicta, n. sp.

Pl. vi, fig. 7.

Shell moderately solid, imperforate, broadly trochoid, whitish above, the upper surface of last whorl greenish-yellow, irregularly covered with a mottled dark-brown somewhat deciduous periostracum, the under-side being of a greenish-yellow colour sharply separated at the periphery by a narrow white band which is continued above at the suture of the last whorl, rather sharply carinated at periphery of body whorl; whorls 5½, moderately convex, regularly increasing, smooth except for the somewhat conspicuous lines of growth, on the under-side of the last whorl there are traces of impressed spiral lines; aperture very oblique, white within; peristome rather broadly expanded and slightly reflected, leaden whitish colour, descending somewhat at its termination.

Maj. diam. 26, alt. 18 millim.

Hab.—New Mecklenburg (New Ireland).

Comes next to *humilis*, Fult., but is of a flatter form, further, the more oblique aperture, carinate last whorl, and different coloration above separate it from that species.

Planispira (Cristigibba) tectorium, n. sp.

Pl. vi, fig. 3.

Shell discoidal, moderately depressed, umbilicus about 2 millim. wide, sub-transparent white with a narrow, pale yellowish brown band encircling the last whorl just above the periphery and continued at the suture of the penultimate whorl, spire convex, almost smooth, the oblique lines of growth not very conspicuous; whorls 5, slightly convex, last descending to the periphery; aperture very oblique, outer band shewing through; peristome rather thin, constricted behind the last whorl, slightly above, but deeply behind the columellar portion, right margin slightly expanded, rather broadly so at columellar portion, which has a slight tubercular swelling about the middle.

Maj. diam. 20, alt. 12 millim.

Hab.—New Guinea (coll. Dr J. C. Cox).

By its coloration and non-planate spire, this species differs from any other of the group known to me.

Strophocheilus (Borus) rugosus, n. n.

= *santacrui*, Pfr.: Monog. Hel., Vol. ii, p. 23., Novit. Conch., vol. iii, p. 416, pl. 95, figs. 1, 2.

= *santacrui*, Pilsbry: Tryon's Manual, vol. x, p. 17, pl. 4, fig. 3.

Strophocheilus santacrui, Orbigny, of which I have seen type in the Orbigny collection, and also a co-type from the Morelet collection (ex Paris Museum), is quite distinct from the specimens identified as that species by Pfeiffer and Pilsbry.

S. santacruxi, Orb., described in the "Mag. de Zool," 1835. Moll., p. 15, and figured in the "Voyage dans L'Amerique meridionale" p. 302, t. 38, figs. 1, 2, is a much smoother shell, the two lower nepionic whorls are sculptured with fine close-set raised striae, and the post-nepionic whorls are covered with a fine spiral granulation.

The lower nepionic whorls of *rugosus* have rather distant strong radial riblets, the penultimate whorl is granulated, but the last has no granulation, but strong rugose oblique striae or lines of growth.

Comparatively speaking, *rugosus* is a rough-looking shell, while *santacruxi* is a smooth one.

***Strophocheilus (Borus) versatilis*, n. sp.**

Pl. vi, fig. 1.

Shell almost imperforate, the opening consisting of a slight chink, oblong-ovate, solid, yellowish-brown with darker oblique stripes, spire short; whorls $5\frac{1}{2}$, moderately convex, the first two smooth, the next $1\frac{1}{2}$ having rather distant, strong, oblique riblets. the middle whorls finely granulated, the last conspicuously malleated, more especially on the last half-whorl, nepionic whorls $3\frac{1}{2}$; aperture narrowly ovate, whitish within; peristome white, thickened and rather expanded, slightly depressed at base of columellar margin, right margin suddenly thickening about half-way down, causing a somewhat tubercular-like projection; a thick white callus over the parietal wall connecting the margins of the peristome.

Alt. 98, maj. diam. 49 millim.

Hab.—(Brazil?).

This partakes of the characteristics of several known species; in form it is similar to *auritus*, Sowb., the sculpture of the middle whorls is like that of *cantagallanus*, Rang., and its nepionic and last whorls have similar sculpture to that of *bronni*, Pfr.

***Strophocheilus (Borus) semimalleatus*, n. sp.**

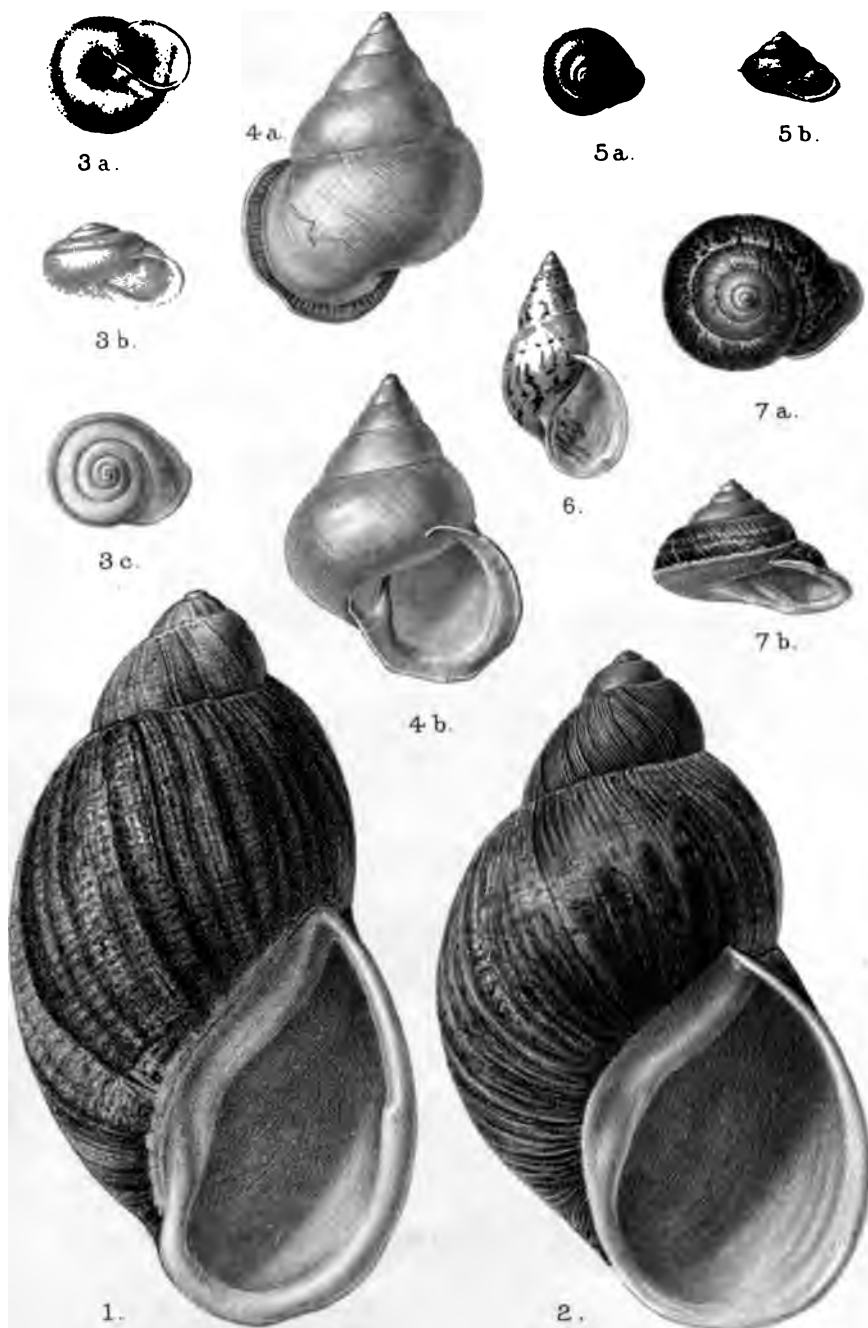
Pl. vi, fig. 2.

Shell imperforate, solid, oval, yellowish-brown cuticle below, reddish-brown above; whorls nearly 6, first one smooth, the next three with rather conspicuous close-set oblique striae. last whorl with more distant, irregular lines of growth and plainly malleated, slightly ascending at its termination; aperture oval, light brown within; peristome thickened but expanded only at the columellar margin, white, continued across the parietal wall by a white callus connecting the right margin.

Maj. diam. 51. alt. 90 millim.

Hab.—Peru.

Type in collection of J. J. MacAndrew, F.L.S.



A. H. Searle, del. et lith.

A. S. Huth, imp.

NEW SPECIES OF LAND SHELLS.

Readily distinguished from *huascari*, Tschudi, to which it bears some resemblance in form and coloration, by its finely obliquely striated protoconch and by the absence of the spiral granulation found on that species.

***Drymaeus regularis*, n. sp.**

Pl. vi, fig. 6.

Shell very narrowly umbilicate, oval acuminate, moderately solid, almost smooth, numerous microscopic, close-set spiral lines, which are (under the lens) more conspicuous on the last whorl, cream-coloured ground ornamented by a spiral series of small dark-brown spots just above the periphery, and zigzag stripes below; the nepionic whorls are horn-coloured, with the usual characteristic *Drymaeus* sculpture; whorls 6, moderately convex, last about as long as the spire, and slightly ascending at termination; aperture oval, violet within, exterior markings shewing through; peristome broadly expanded, violet, paler at margin, thin, columellar margin dilated at point of insertion.

Maj. diam. 16, alt. 31; peristome, maj. diam. 13, alt. 17 millim.

Hab.—Chanchamayo, Peru.

Near *similaris*, Moric., from which it can be readily distinguished by its broader and lilac-coloured peristome.

The colour-markings of *regularis* are smaller and more spirally arranged than in *similaris*, in which the stripes are longitudinally zigzag.

EXPLANATION OF PLATE VI.

- Fig. 1. *Strophocheilus (Borus) versatilis*, n. sp.
- Fig. 2. *Strophocheilus (Borus) semimalleatus*, n. sp.
- Fig. 3. *Planispira (Crisiagibba) tectorium*, n. sp.
- Fig. 4. *Papuina lilium*, n. sp.
- Fig. 5. *Papuina (Dendrotrochus) fumila*, n. sp.
- Fig. 6. *Bulimulus (Drymaeus) regularis*, n. sp.
- Fig. 7. *Papuina supracincta*, n. sp.

NOTE ON THREE SPECIES OF PELECYPODS.

BY EDGAR A. SMITH, I.S.O.,

British Museum (Natural History) London.

1.—*Crassatellites ponderosus* (Gmelin).

In the Proc. Linn. Soc. N.S.W. 1904, part 1, Mr. C. Hedley, in a valuable paper on some Australian Mollusca, has questioned the propriety of calling a species of *Crassatellites*, *C. kingicola*, Lamarck, substituting the name of *ponderosus* of Gmelin.

This species was founded by the latter author on figures and a description published by Chemnitz in "Der Naturforscher," Stück xix (1783) pp. 185, 186, pl. viii, and in the "Conchylien Cabinet" (1784), vol. vii, pp. 61, 62, pl. lxi, figs. A—D, the latter figures being rough copies of those in "Der Naturforscher." I feel quite certain that the shell figured by Chemnitz is not the same as the well-known *C. kingicola*, Lamarck. In the first place the form is different, being shorter and squarer, and the posterior end is both less narrowed and prolonged. Then again, in *kingicola* the posterior adductor scar is invariably of a very dark brown colour which is not mentioned by Chemnitz and is not likely to have been overlooked by him if it existed in his specimen, and still further, why should the artist draw a crenulated edge to the valves, a feature non-existent in *C. kingicola*, if it were not present in the shell before him, and why did Chemnitz write "margine subcrenulato" in his latin diagnosis, and refer, in his further description, to "den feinen Kerben ihres Randes und Umrisses"?

Mr. Hedley states that Gmelin incorrectly gives "margine crenulato" as a character, and that his error arose from the fact that Chemnitz's artist used a dotted line to represent the inner edge of the valve-margin. He also observes "the pallial line, which could hardly be 'crenulated,' is indicated by a similar dotted line." Mr. Hedley never saw the original figures in the "Naturforscher," and apparently could not have closely followed the description given by Chemnitz or he could not have made these statements. Gmelin evidently had both seen the figures and read the description, and consequently was quite justified in writing "margine crenulato." For the information of those who may not have the opportunity of seeing the work in question, I may mention that the pallial line is properly drawn in both figures of the interior of the valves and not dotted as it appears in the rough copies in the "Conchylien Cabinet."

I am of opinion that Lamarck, followed by Deshayes and others, was quite right in considering Gmelin's species the same as the Grignon fossil, *C. tumida*, Lamarck. It agrees in form, sculpture, the enormously thick hinge and the crenulated margin.

Chemnitz's specimen was presented to him by the Messrs. Favanne de Montcervelle who were not certain of its locality, but merely state that it was given to them as having been collected on the coast of New Guinea. This I regard as altogether erroneous, and I have no doubt as to its being the fossil shell.

2.—*Area pistachia*, Lamarck.

Mr. Hedley (l.c. supra, p. 202) regards this species the same as *A. radula* which I described in the Report upon the "Challenger" Lamellibranchiata, but I cannot admit that he is the least justified in so doing on the grounds stated by him. Lamarck's description is altogether inadequate for the determination of any species, and he neither gave nor referred to any figure. He described his shell as "ovata" and "extus grisea," characteristics which certainly are not applicable to *A. radula*. Mr. Hedley also observes,— "Lamarck's "intus fusco-nigricante; natibus proximis" are recognition-marks which distinguish the species from Australian congeners." This, however, is not true, for both *A. fasciata*, Reeve, and *A. fusca*, Bruguière have the interior more or less dark coloured, and the umbones quite as close together as they are in *A. radula*. Perhaps M. Lamy, who is studying the *Arcidae*, may throw some light upon this subject, but at present I cannot see there are any grounds for uniting the species in question.

Mr. Lamy does not quote *A. pistachia* in his list of species preserved in the Paris Museum with Lamarck's labels, but merely refers to Deshayes's opinion that it differs little from *A. fusca*.

Timor and King Island, the localities given by Lamarck, do not assist us in the identification as they are in different seas on opposite sides of Australia.

3.—*Cardium bechei*, Reeve.

This very fine *Cardium* was originally described by Reeve (Proc. Zool. Soc., 1847, p. 25), the description subsequently being reproduced in the Zoology of the Samarang with the word "*we*" substituted for "*I*"; hence it is that Adams and Reeve have generally been regarded as the joint authors of the species. The original reference, however, has not been entirely overlooked, as stated by Mr. Hedley (l.c. p. 95), for Tryon in his catalogue of *Cardiidae* (Amer. Journ. Conch., vol. vii, p. 268) gives it correctly although he places the authors' joint names after the species probably in deference to Reeve's wish that the species should stand under his own and Adams's name, for we cannot suppose that he was unaware of having a year previously described the species when he reproduced the original description with the slight alteration referred to.

The two very fine specimens in the British Museum mentioned by Melvill and Standen (J. Linn. Soc. Zool., vol. xxvii, p. 192) were received from the Chinese Court of the International Fisheries Exhibition of 1883. They are quite as large and in as perfect condition as the shell figured by Dunker in his Index Moll. Maris Japonici, pl. xv, figs. 1—3.

Correction.

In the April number of the Journal an unfortunate error crept into Mr. G. K. Gude's paper. On page 13, under *Charopa ochracea*, n. sp., the eighth line should read

Diam. 2.5 millim. ; alt 1.
and not alt. 8 as printed.

CURRENT LITERATURE.

Pilsbry, H. A.—Manual of Conchology, ser. ii, vol. xvii (pt. 67), pp. 113—208, pls. 24—43. Philadelphia : Academy of Natural Sciences.

The present part continues the account of the *Achatinidae*. Under *Archachatina* a new variety of *A. rhodostoma* (Phil.), v. *splendida* is described and v. *adelinae*, nov. of *A. papyracea* (Pfr.), both from West Africa. The following genera are then dealt with : *Columna*, Perry, *Callistoplepa*, Ancey, *Homorus*, Albers, under the sub-genus *Subulona*, Marts., of the last-mentioned genus *H. pallatus* is a new species from Cape Palmas, Liberia, also *H. opeas*. Then follow accounts of the genera *Ceras*, Dup. and Putz., *Pseudoglessula*, Boettg., *Chilonopsis*, F. de Waldh. (and the sub-genus *Cleostyla*, Dall), *Trichodina*, Ancey, with *T. aratispira* a new species from Liberia (?), the part concluding with accounts of *Clavator*, Marts., and *Riebeckia*, Marts., in part.

Hoyle, William E.—The Cephalopoda. From the Fauna and Geography of the Maldives and Laccadive Archipelagoes, vol. ii, supplement i, pp. 975—988, pl. xcv, text-figs. 144—153.

The actual number of specimens identified in this collection is thirteen, of which the prize is undoubtedly a specimen of *Ancistrochirus lesneuri*, which was found floating on the surface. One new species is described, *Polyptus gardineri*.

Bloomer, H. H.—On the Anatomy of certain species of *Siliqua* and *Ensis*. Proc. Malac. Soc. Lond., 1905, vol. vi, pp. 173—196, pl. xii.

Mr. Bloomer describes the anatomy of *Siliqua patula* (Dixon), from which *S. costata* (Say) differs only in certain points in the shell. *Ensis directus* (Conrad), he finds closely resembles *E. ensis*, as does also *E. minor*, Dall.

Elliot, C. N. E.—Notes on two rare Nudibranchs, *Hero formosa*, var. *arborescens*, and *Staurodoris maculata*. Proc. Malac. Soc. Lond., 1905, vol. vi, pp. 239—243.

From St. Andrews, N.B., the author has received specimens of a well marked variety (*arborescens*, n. var.) of *Hero formosa*, which possibly may merit specific rank. The other species, *Staurodoris maculata* (Garst.), is from Plymouth. Possibly this is von Ihering's *St. pseudoverrucosa*, from Naples, and the *Doris eubalia* of Fischer, from Arcachon, the young of this species.

Blanford, W. T.—Descriptions of Indian and Burmese Land-Shells referred to the Genera *Macrochlamys*, *Bensonina*, *Taphrospira* (gen. nov.), *Microcystina*, *Euplecta*, and *Polita*. Proc. Zool. Soc., 1904, pp. 441—447, pl. xxv.

The new species are *Bensonina nepalensis*, Nevill MS., *Taphrospira* (gen. nov.), type *T. conrallata*, Bs., *T. excavata*, *Macrochlamys kulucensis*, Nevill MS., *M. superflua*, *M. (?) atoma*, Fairbank MS., *M. prava*, *M. rutila*, *M. chaos*, *M. notha*, *M. noxia*, *M. curvilabris*, *M. spreta*, *M. palens*, *M. pseudochoinix*, *Microcystina stuarti*, Godwin-Austen MS., *M. shevaroyana*, *Euplecta pulchella*, and *Polita (?) turbinata*.

Nierstrasz, H. F.—Bemerkungen ueber die Chitonensammlung im Zoologischen Museum zu Leiden. Notes from the Leyden Mus., 1905, vol. xxv, pp. 141—159, pl. 9, 10.

The author describes and figures the following new species: *Callistochiton leidensis*, and *C. porosus*, and gives notes and figures on other species.

Farran, G. P.—Report on the Opisthobranchiate Mollusca collected by Professor Herdman, at Ceylon, in 1902. From Rpt. on Pearl Oyster Fisheries of the Gulf of Manaar. Roy. Soc. Lond., 1905, pp. 329—364, pls. i—iv.

The collection comprises thirty species of Nudibranchs, of which nine are new, twelve are fairly well-known tropical species, four are identified with species described by Abraham or Quoy and Gaimard, but of which little was known, and five are too small to identify satisfactorily. The new species are: *Herzia ceylonica*, *Galvina producta*, *Linguella cinerea*, *Platydoris herdmani*, *P. (?) spinulosa*, *Halgerda punctata*, *Thordisa (?) caudata*, *Chromodoris tenuilinearis*, and *Aegires villosus*.

(Of the Tectibranchiata there are seventeen species, of which seven are described as new, viz., *Aplysia intermedia*, *Phyllaplysia albomaculata*, *P. pellucida*, *Aplysiella mollis*, *Dolabrifera marginata*, *Notarchus ceylonicus*, and *Pleurobranchus hornelli*.)

An Appendix records *Onchidium verruculatum*, Cuv., and *Marsenia perspicua* (Linn.).

Ellot, C.—On some Nudibranchs from East Africa and Zanzibar. Part vi. Proc. Zool. Soc. Lond., 1905, pp. 268—298, pls. xvi, xvii.

The following new species are described: *Orodoris striata*, *Dolo africana*, *Herzia lineata*, *Phidiana tenuis*, *Facelina lineata*, *Stiligar varians*, *S. irregularis*, and *Elysia dubia*. Nineteen other species are recorded with notes thereon.

Ellot, C. N. E.—On some Nudibranchs from the Pacific, including a new genus, *Chromodoriella*. Proc. Malac. Soc. Lond., 1905, vol. vi, pp. 229—238.

The author states that the type of this new genus (*C. mirabilis*) "may be succinctly described as a *Chromodoris* with the branchial pocket situated, not on the dorsal surface, but on the under side of the body, and pointing downwards." The author confesses to considerable doubt as to whether it is a normal form or a monstrosity.

Sacco, F.—I Molluschi dei terreni terziarii del Piemonte e della Liguria. Torino, 1904, pp. i—xxxvi.

Lebour, M. V.—Additions to the List of the Marine Mollusca of Northumberland. Rpt. Sci. Inv. Northumberland Sea Fish. Comm., 1904, p. 85.

Ihering, H. von.—On the genus *Tomigerus*, Spix, with descriptions of new species. Proc. Malac. Soc. Lond., 1905, vol. vi, pp. 197—199, figs. 1—3.

Suter, Henry.—Notes on some New Zealand *Pleurotomidae*. Ibid., pp. 200, 201.

Suter, Henry.—Notes on some species of *Chione* from New Zealand. Ibid., pp. 202—205.

Dall, W. H.—An arrangement of the American *Cyclostomatidae*, with a revision of the nomenclature. Ibid., pp. 208—210, figs. 1, 2.

Jukes-Brown, H. J.—A Review of the genera of the family *Mytilidae*. Ibid., pp. 211—224.

Melvill, J. C. and Standen, R.—*Rostellaria delicatula*, Nevill. Note upon its distribution and limits of variation. Journ. Conch., 1905, vol. ii, pp. 161—163, pl. ii.

- Melvill, J. C.**—The sub-genus *Casmaria*, H. and A. Adams, of *Cassis*, Lamarck. Ibid., pp. 176—178.
- Melvill, J. C.**—Four Colour Varieties of *Cypraea*. Ibid., p. 192.
- Vayssière, A.**—Étude sur les coquilles de quelques *Cypraea*. Journ. de Conchyl., 1905, vol. liii, pp. 5—17, pl. 1.
- Bavay, A.**—Sur quelques espèces nouvelles, mal connues ou faisant double emploi dans le genre *Pecten*. Ibid., pp. 18—30, pl. ii.
- Signal, L.**—Note sur la section *Pyrazus* dans le genre *Potamides*, et description d'une espèce nouvelle. Ibid., pp. 31—45, fig.

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NOTES ON A COLLECTION OF CALIFORNIAN
NUDIBRANCHS.

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(Plates vii and viii.)

The animals described below were collected by Mr. Cockerell at San Pedro and La Jolla in South California (about 33° S). He also supplied the coloured sketches and accounts of the living animals which added much to the value of the present paper, and I have, therefore, coupled his name with mine as one of the authors, since it was not always possible to quote his descriptions as they generally take the form of a few words written at the sides of rough sketches. But he is not responsible for the descriptions of the preserved specimens or for any of the views expressed in the following pages. The new specific names are due to him, the generic names to me. Some of the specimens had been deposited in the British Museum, and I have to thank Mr. E. A. Smith for kindly allowing me to examine them.

The collection contains the following species:—

1. *Tritonia palmeri*, Cooper.
2. *Archidoris montereyensis* juv. (Cooper).
3. *Cadlina flavomaculata*, MacFarland.
4. *C. marginata*, MacFarland.
5. *Chromodoris californiensis*, Bergh. = *Chr. universitatis*, Cockerell.
6. *Doridopsis vidua* (?), Bergh.
7. *D. reticulata*, n. sp.
8. *Acanthodoris rhodoceras*, n. sp.
9. *Laila cockerelli*, MacFarland.
10. *Triopha* sp.
11. *Aegires albopunctatus*, MacFarland.
12. *Dirona picta*, MacFarland.
13. *Janolus coeruleopictus*, n. sp.
14. *Spurilla chromosoma*, n. sp.
15. *Hermisenda opalescens* (Cooper).
16. *Phyllobranchopsis enteromorphae*, gen. et spec. nov.

The specimens are small and the majority are not well preserved. This is especially regrettable in the case of the two rather remarkable new genera *Dirona* and *Phyllobranchopsis*, but the characters which can be established with certainty seem to warrant the descriptions here given. The small size of the specimens, particularly the Dorids, is noticeable. It does not appear to be characteristic of the Californian fauna for it is not supported either by Mac Farland's observations or by my own made when visiting this coast in 1899. Mr. Cockerell collected both at San Pedro and La Jolla in July and August. It seems probable that the animals spawn early in the summer so that at this period young and half-grown individuals are prevalent. The specimens of *Hermisenda* on the other hand are larger than those recorded hitherto.

The latitude of San Pedro and La Jolla is about the same as that of the Canary Islands, and as far as the nudibranchs of this part of the Atlantic are known, the character of the fauna in this group seems much the same in both Oceans. The northern element appears to be the stronger, as shown by the prevalence of forms like *Archidoris*, *Cadlina*, *Acanthodoris*, *Aldina*, *Rostanga* and various Polycerids, while such tropical genera as *Chromodoris* and *Doridopsis* are sparingly represented. *Platydoris*, so common in the Indo-Pacific, has not yet been found in California, but *Chromodoris* appears to extend further north than in the Atlantic, being recorded from Puget Sound. Specially characteristic of this coast is the number of Polycerids, both in species and individuals, such as *Triopha* and *Laila*. Aeolids are also abundant.

Another remarkable feature of the nudibranch fauna of the Pacific coast of North America is the number of species closely resembling or even identical with those found in the northern Atlantic. Bergh considers that *Archidoris tuberculata*, *Acanthodoris pilosa*, *Lamellidoris bilamellata*, *Dendronotus arborescens* as found in these waters are not specifically distinguishable from the Atlantic forms. *Spurilla chromosoma* is nearly related to *Sp. neapolitana*, *Aeolidia herculea* to *Ae. papillosa*, *Tritonia palmeri* to *T. plebeia* and *T. lineata*, *Aegires albopunctatus* to *Ae. punctilucens*, *Adalaria pacifica* to *A. proxima*. It is noticeable also that the fauna of New Zealand and the extreme south of the Pacific as far as it is known presents many analogies to that of the northern Pacific and northern Atlantic. On the other hand, some of the commonest Californian nudibranchs belong to genera which have not been found elsewhere, such as *Triopha*, *Laila*, *Hermisenda*.

The nudibranchs of this coast were first noticed by Cooper and Stearns, but the most important contributions to our knowledge of them, are contained in Bergh's Nudibranchiate Gastropoda of the North Pacific (1879), published in Dall's Scientific Results of the Exploration of Alaska, and Mac Farland's Preliminary account of the *Dorididae* of Monterey Bay, California (Proc. Biological Society of Washington, Feb. 2nd, 1905, vol. xviii.). It is understood that the latter author is about to publish a fuller account of the

Dorididae with plates, and will also deal with the *Aeolididae*. Even the preliminary diagnoses are models of lucidity, but I must confess that I do not at present see why a new genus is required for *Montereina*, or why *Hopkinsia* is separated from *Idalia*.

***Tritonia palmeri*, Cooper.**

Pl. vii, figs. 1, 2.

Cooper: Proc. Calif. Acad. Nat. Sci., 1863, II. p. 207; Cockerell: Nautilus, 1902, xv. p. 117.

One small specimen from Dead Man's Island, San Pedro, found between tides. The notes on the living animal state that it was about 17 millim. long, white, but strongly suffused with yellow dorsally. The back is described as rugose with small warts. There were five or six "ramose branchial lamellae" on either side.

The alcoholic specimen is 10 millim. long, nearly 5 broad, and 4 high. It is very badly preserved and little can be made out of the external characters except that the shape is square and thick set, and that the oral veil bears about 10 digitate processes. The tail is short and broad.

The central nervous system is whitish and granulate, apparently much as in *T. Hombergi*. The eyes are large and black; the jaws are long, yellowish with 4—6 rows of very strong and distinct denticles on the edge and a mosaic pattern behind them.

The formula of the radula is $36 \times$ about 35. 1. 1. 1. 35 as a maximum, but many of the rows are considerably shorter. The median tooth (Fig. 1a.) bears three very distinct thick cusps, that in the centre pointed, those at the sides rounded. The first lateral (Fig. 1b) has a broad base, but is distinctly hamate, the hook coming over the side of the median tooth. The remaining laterals (Fig. 2) are rather straight and not very thick. Those near the outside are longer but the outermost are shorter. No armature was discovered in the stomach.

This form appears to be clearly distinct from *T. tetraquetra*, *gigantea*, *exulans*, and *diomedea* recorded from the Pacific coast of North America and to be allied to *T. (Candiella) plebeia* and *lineata*. It is distinguished by its coloration and the larger number of processes on the velum. The dentition appears to resemble that of *T. lineata* rather than *T. plebeia*, but the teeth are not a very certain criterion in this genus.

The genus *Tritonia* is recorded chiefly from the temperate parts, northern as well as southern, of both the Atlantic and Pacific. Nearer the Equator it appears to be replaced by *Marionia*, though its absence cannot be regarded as certain. Including the sub-genus *Candiella*, it contains about 24 species, some of which are doubtful. To the sixteen enumerated in Bergh's System der Nudib. Gasteropoden, the following may be added: 17. *T. diomedea*, Bergh. 18. *T. exulans*, Bergh. 19. *T. incerta*, Bergh. 20. *T. australis*, Bergh. 21. *T. gigantea*, Bergh. 22. *T. ingolfiana*, Bergh. 23. *T. villafranca*, Vayssière. 24. *T. appendiculata*, Eliot. *Tritonia alba*, described but not figured, by Alder & Hancock, is a somewhat doubtful form.

***Archidoris montereyensis*, juv. (Cooper).**

Three small specimens from La Jolla may be immature individuals of this species; they are all less than a centimetre long, yellowish in colour, and indistinctly tuberculate. The tentacles are flattish and grooved, the branchiae seven and tripinnate; the radula is about 30×45 . o. 45; the teeth are colourless, hamate, crowded near the rhachis and bear a lateral wing-like expansion. There is no labial or genital armature.

The genus *Archidoris* is recorded chiefly from temperate seas, but is perhaps cosmopolitan in its distribution, as two species are found in equatorial East Africa. The common British *A. tuberculata* appears to be also found on the Californian coast. Bergh, in his System recognizes five species, or six if *A. marmorata* is considered distinct, and the following have since been added:—

7. *A. stellifera*, Jher.
8. *A. rubescens*, Bergh.
9. *A. incerta*, Bergh.
10. *A. nyctea*, Bergh.
11. *A. africana*, Eliot.
12. *A. violacea*, Bergh.
13. *A. minor*, Eliot.
14. *A. nanula*, Bergh.
15. *A. wellingtonensis*, (Abraham).

Bergh has created separate genera for *Anisodoris* and *Homoiodoris*, both of which resemble *Archidoris* externally, but are distinguished from it by the presence of a prostate, and from one another by the vagina having an armature in *Homoiodoris* which is absent in *Anisodoris*. If these genera are retained, I cannot see why *Montereina*, Mac F. (Mac Farland, l.c. p. 38) is separated from *Anisodoris*. It appears to have the same essential characters both internal and external, and to differ in being larger, more arched, and in bearing larger tubercles, all of which seem differences of degree hardly amounting to generic characters.

***Cadlina*, Bergh.**

This genus, which is distinguished from most cryptobranchiate Dorids by the presence of a median tooth, is recorded only from the cold and temperate seas of the northern hemisphere. The known species are:—

1. *C. repanda* (A. & H.). N. Atlantic.
2. *C. glabra* (Friele & Hansen). N. Atlantic.
3. *C. clarae*, Jher. Med.
4. *C. pacifica*, Bergh. West Coast of N. America.
5. *C. flavomaculata*, Mac F. West Coast of N. America.
6. *C. marginata*, Mac F. West Coast of N. America.

The genus will, perhaps, prove characteristic of the Coasts of North West America, since three species are already recorded. The animal described

below as *C. marginata* (?) is certainly a *Cadlina*, but perhaps a new species.

Tyrinna, Bergh. from the West Coast of South America has a similar dentition.

***Cadlina flavomaculata*, Mac Farland.**

Mac Farland: Prelim. account of *Dorididae* of Monterey, pp. 43—4.

Two small specimens from La Jolla, one elongate (8×3 millim) the other almost circular and with an ample margin. Neither are well preserved and the colours have almost entirely vanished, though it can still be seen that the rhinophores were very much darker than the rest of the animal. The back is tuberculate; the oral tentacles flat; the branchiae are about 10, and apparently simply pinnate. The labial armature is yellowish and consists of close-set deeply bifid rods. The radula is narrow, the formula being about 90×27 . 1. 27, but many rows are shorter. The central tooth is large and strong, and bears 4—5 distinct, long denticles of much the same size. The first laterals are stout, with 2—3 denticles on the inner side, and 5—6 on the outer side of the central cusp. The remaining laterals are denticulate on the outer side only, and near the rhachis bear 12—15 minute serrulations which increase in size and prominence about the middle of the row, so that the teeth of the outer-half have, as Mac Farland says, a saw-like appearance.

Cockerell says the living animal which was found in kelp roots washed up on shore was white, with 5 sulphur yellow spots on each side. The rhinophores were very conspicuous dark-reddish brown, with about six perfoliations on each side and white tips. The skin was spiculous, and the oral tentacles short and triangular.

Externally this species seems characterised by the dark rhinophores, contrasting markedly with the otherwise pale colouration, internally by the large and deeply denticulate central tooth. The simply pinnate branchiae are also noticeable.

***Cadlina marginata*, Mac Farland. (?)**

Mac Farland: l.c., p. 43.

Three small specimens from La Jolla are probably referable to this form in virtue of their buccal parts, though none of their external characters can be traced, the animals being much contracted, smooth and of a uniform purplish-grey.

The labial armature consists of bifid hooks. The radula consists of about 80 rows, containing 40—50 teeth on each side of the rhachis. The rhachidian tooth is not conspicuous, and bears 4—5 small blunt denticles. The innermost laterals are strongly hooked with 3 denticles on the inner and 6—7 on the outer margin. The remaining laterals become longer and slenderer towards the end of the rows, and bear about 12 denticles on the outside only. The outermost teeth are rudimentary and irregularly jagged.

Chromodoris, Ald. & Hanc.

This large genus, the most numerous in species of all the *Dorididae* crypto-branchiatae, is chiefly found in warm seas, and is specially characteristic of the tropical Indo-Pacific. It occurs in the Mediterranean, and is probably found in the adjacent parts of the Atlantic, though it appears to be recorded only from the Cape Verde Islands and the Bermudas, the latter record not being very certain. In the Pacific it is recorded from as far north as Japan, and on the American Coast from Puget Sound and Monterey: in the south from New Zealand, Tasmania and Juan Fernandez.

The brilliant coloration, common in the genus, has caused a great number of species to be figured and described, often very inadequately. Burgh's list in the System includes 105 species, and about 18 have been described since. *Chr. universitatis*, Cockerell, as explained below, appears to be *Chr. californiensis*, B., and *Chr. tenuilinearis*, Farran (1905), is, I think, the same as *Chr. nigrostriata*, Eliot (1904). Bergh has shown that *Chr. elizabethina* should be called *Chr. quadricolor* (Rüppel & Leuckart), and *Chr. petechialis* (Gould) 1852, is probably identical with *Chr. tunulifera*, Collingwood and *Chr. pallescens*, Bergh. *Chr. aureo-marginata*, Cheeseman (Trans. New Zealand Institute, 1880, xiii, p. 223.) is probably identical with one of the many previously described species which have a similar coloration. The following species are more or less valid:—

106. *Chr. agassizii*, Bergh.
107. *Chr. porterae*, Cockerell.
108. *Chr. macfarlandi*, Cockerell.
109. *Chr. sykesi*, Eliot.
110. *Chr. cavae*, Eliot.
111. *Chr. annulata*, Eliot.
112. *Chr. splendens*, Eliot.
113. *Chr. vicina*, Eliot.
114. *Chr. nigrostriata*, Eliot.
= *Chr. tenuilinearis*, Farran.
115. *Chr. inconspicua*, Eliot.
116. *Chr. (?) flava*, Eliot. (Anatomy unknown.)
117. *Chr. tasmaniensis*, Bergh.
118. *Chr. figurata*, Bergh.
119. *Chr. aegialia*, Bergh.
120. *Chr. atopa*, Bergh.

Chr. (?) roseo-picta, Verrill, is an interesting form, but some doubt must remain as to its genus, since the dentition is unknown, and it bears papillae on its back which is unusual in *Chromodoris*.

The *Chromodorids* recorded from the North West Coast of America are *Chr. dalli*, *californiensis*, *agassizii*, *macfarlandi*, *porterae* and *aegialia* (Gulf of California.)

***Chromodoris californiensis*, Bergh.**

= *Chr. universitatis*, Cockerell.

Bergh: Exploration of Alaska: Nudibranchiata part I, 1879, p. 112;

id. Bull. of Mus. of Comp. Zool. Harvard, 1894, vol. xxv. no. 10;

Cockerell: Nautilus, June 1902, p. 19.

One specimen marked by Mr. Cockerell "one of the type lot," captured at San Pedro, California, August 1901. It is unfortunately very much wrinkled and contorted, so that little trace of its former appearance remains.

Length 28.5 millim.; height 15.5; breadth 12; length of tail 11 millim. The colour is a dirty bluish-grey, which shows traces of yellow here and there, though no spots can be distinguished. The mantle has disappeared entirely at the sides, but it is ample behind, where it bears on its lower surface seven large brown globes, 2.5 millim. in diameter. They are hollow and filled with a mass of yellowish granules, which is not attached to the walls, but lies free, like the contents of a stomach. The mantle is not ample over the head, the tentacles are fairly large, partially retracted, with pits at the tips. The edge of the rhinophore pockets are raised, but not those of the branchial orifice, which is small, with a flat thickened rim. The branchiae are entirely retracted and set in a circle open behind. One plume is trifid, one quadrifid and the rest simply pinnate. The foot is grooved in front but not notched.

The internal organs and membranes are greenish, much hardened, but apparently as usual in the genus. The liver is large; the labial armature consists of two olive coloured plates, composed of mace-shaped elements, set so as to form a tessellated pattern. The radula consists of 106 rows, containing more than 100 teeth on each side of the naked rhachis. The first ten rows or so are deep brown, the rest yellowish. The teeth are bifid, with about 8 denticles on or below the lower prong. The upper prong is not denticulate. The inner teeth are smaller, lower, and bear fewer denticles. The outermost are also lower and rather irregular.

If this is the type of *Chr. universitatis*, Cockerell, there would appear to be no sufficient ground for separating that species from *Chr. californiensis*, Bergh, which is recorded from the Santa Barbara Islands, Monterey and San Diego. The buccal parts of the two agree, and both have conspicuous spherical projections on the under side of the posterior mantle. The coloration also is similar. *Chr. universitatis* is described by Cockerell as "dark rich ultramarine blue; the edge of the mantle and foot bright cobalt blue; mantle with two longitudinal series of oblong very bright orange spots, about 7 in a series; five round orange spots on the anterior part of the mantle in front of the rhinophores." Dall described the living *Chr. californiensis* as "mazarin blue with golden spots," and according to Bergh the preserved specimen was "greenish blue. On the back were several yellowish-white round spots. On the anterior part, they were chiefly in the median line, on the rest, in two longitudinal series . . . a brighter fine line seemed to border

the margin of the mantle edge, and that of the foot." The branchiae are recorded as 12 in *Chr. universitatis*, and 9—10 in *Chr. californiensis*, but this variation can hardly be regarded as specific.

Acanthodoris, Gray.

This genus, and indeed the whole family to which it belongs, (including *Akiodoris*, *Doridunculus*, *Alalaria* and *Lamellidoris*) has hitherto been found only in the cold or temperate seas, but penetrates into Arctic waters and probably also Antarctic, as it is recorded from far south. Only the rather doubtful *Lamellidoris* (?) *graeffii*, Bergh, is recorded from the Mediterranean. Bergh enumerates 8 species of *Acanthodoris* in his System, but of these *A. stellata*, Verrill seems to owe its existence merely to a question of nomenclature.* Since then, the following species have been added :—

8. *A. metulifera*, Bergh.
9. *A. hudsoni*, Mac Farland.
10. *A. brunnea*, Mac Farland.
11. *A. (?) vatheleti*, Mabile & Rochebrune.
12. *A. rhodoceras*, n. sp.

From Behrings Sea, and the Pacific Coast of North America are recorded *Ac. pilosa* (typical), *Ac. pilosa* var. *albescens*, do. var. *purpurea*, *Ac. coerulea*, *Ac. hudsoni*, *Ac. brunnea*, and *Ac. rhodoceras*. The common British *Ac. pilosa* appears to have an astonishingly wide distribution, for forms which Bergh regards as mere varieties of it are found in the North Pacific, New Zealand and Tasmania. It is remarkable, however, that in all the known southern forms, the verge is unarmed, a fact worth bearing in mind when estimating the importance of this character, which is thus admitted to vary within the limits of the same species.

Acanthodoris rhodoceras, n. sp.

Pl. vii, figs. 3, 4.

One specimen from Dead Man's Island, San Pedro, California. It is soft, flat, oval and well preserved. The notes on the living animal say that the back bore hyaline papillae and also shorter black papillae. On the dorsal margin was a narrow black band, edged below with yellow. The rhinophores were reddish with a yellow streak, the left paler, and with more yellow than the right. The length was about 15 millim. From a rough sketch it would appear that the ground colour of the back was yellowish-grey; the sole was white. The colours are still recognizable. The back is pinkish-grey, and is

* If I rightly understand Verrill (Am Journ of Sci. and Art. 1879, p. 313), he considers that his specimens = *Doris stellata*, Gmelin, = *Doris pilosa*, A. & H., but are different from *D. pilosa*, Müller. If so the animal should be called *Ac. stellata* (Gmelin). But both Bergh and Alder & Hancock seem to regard the animal figured by the latter authors (which is Gmelin's *Doris stellata*) as identical with *Doris pilosa*, Müller. If so, *Ac. stellata* has no separate existence.

covered with black-tipped papillae, among which, especially near the margin, are some rather larger colourless papillae. The black tips of the papillae, and the black border round the mantle are very vivid and distinct. The length is 12 millim.; the breadth 10 millim., and the maximum height 5 millim. The rhinophores are retracted, and the pockets not very easy to see as they are surrounded by tubercles, some colourless, some tipped with black. The branchiae are pinkish-grey, not ample, bi—and in places tripinnate. They are five in number, but in a vacant place on the right side of the circuit are some rudimentary plumes, suggesting that the full number is six. Though there is no pocket into which the branchiae can be retracted, the branchial area is differentiated from the rest of the back. It is of a deeper pink colour, bears very few tubercles, and in parts, though not everywhere, is surrounded by a rim formed by the union of some of the dorsal papillae. This is probably the same arrangement as that described by Abraham for *Calycidoris*. The anal papilla is central. The foot (9 millim. \times 6.5 millim.) is broad and rather abruptly pointed behind. The anterior margin is straight. The head is surrounded by a crescent-shaped veil about as wide as the foot, and prolonged into short horns on either side. The sides of the body, the margin of the mantle, and the branchial area contain a fair number of spicules, but there are none in the rest of the dorsal surface. They are brownish rods, bearing many marks resembling joints and divisions, bent in various ways, but not branched or thickened in the middle.

The buccal mass is pinkish; the ingluvies buccalis which is imbedded in it is divided into two halves by a white stripe. The labial cuticle bears two prominent thick folds. The labial armature is a band of mosaic consisting of squarish blocks (Fig. 3), irregularly cleft (often quadrifid) at the top. Below these clefts are a number of minute, hardly visible, prominences. The formula of the narrow radula (Fig. 4), is 27×5 or $6. 1. 0. 1. 5$ or 6 , the sixth tooth being very often absent. The rhachis is quite bare; the innermost teeth are much larger than the others, and of the shape usual in this genus. They have a large base and bear about 5 denticles (sometimes with a few smaller additional denticles) near the top of the hook. The other teeth are much smaller and are almost covered by the broad base of the first tooth; they decrease in size outwards, and are quite smooth, but preserve something of the hamate shape.

The liver is large and greenish; the greater part of it is covered with a thick white layer, formed by the hermaphrodite gland. The mucous gland is large, white and transparent. The spermatoduct is long and consists of two parts, the upper soft, and the lower muscular; this lower portion and the verge are thickly covered with small, slightly hooked, transparent prominences. The central nervous system is distinctly granulate. The pedal ganglia are set below, and at the sides of the cerebro-pleural. The eyes are on rather long stalks.

Doridopsis.

This large genus has much the same distribution as *Chromodoris*, and like it, is specially characteristic of the tropical Indo-Pacific. It is found in the Mediterranean, and is recorded from various parts of the Atlantic, extending as far north as the Bay of Biscay. In the more Northern Pacific it is recorded from Ningpo and Yokohama, on the Asiatic side, and from California, as far north as Monterey, on the American side. The only known Californian form besides those described below is *D. fulva*, MacFarland.

Bergh's list in the System includes 60 species, but *D. vidua* and *D. spiculata* are omitted from it, and no. 40 *D. lacera* (Cuv.) = *D. wellingtonensis*, Abr., should be removed, for *D. lacera* is almost certainly a *Hexabranchius*, and *D. wellingtonensis* is an *Archidoris* (see Eliot, Proc. Mal. Soc., 1905, p. 236.). Few new forms have been described of late years, and it would appear that the list can be brought up to date as follows :—

60. *D. vidua*, Bergh.
61. *D. spiculata*, Bergh.
62. *D. fulva*, MacFarland.
63. *D. punctatella*, Bergh.
64. *D. reticulata*, n. sp.

Doris radiata, van Hasselt, of which there is a beautiful figure in Bergh's notes from the Leyden Museum, is probably a *Doridopsis*.

The species of *Doridopsis* are very difficult to diagnose and distinguish, as the colours are remarkably variable, and the internal organs offer few important differences. There is no radula or other buccal armature.

Doridopsis vidua (?), Bergh.

Bergh: Neue Nacktschnecken, iv, Journ. des Mus. Godeffroy, 1878, Heft. xiv, 1 p. 35—6.

A single specimen from La Jolla, July 1901, described by Cockerell as *Doris nigromaculata*, n. sp., without further notes. It is 10 millim. long, 5 millim. high, and 4 millim. broad across the branchiae, but is broader behind than in front. The back is strongly arched, but this shape is perhaps not natural as the animal is bent. The surface is smooth, not tuberculate, and a number of glistening white spicules can be seen imbedded in the skin. They are mostly fairly straight long rods, but some of the smaller ones are bent and have an irregular outline. The colour of the animal, as preserved, is a yellowish-drab with a slight inclination to lilac in places. There is a double border of black spots round the dorsal margin, and a few larger black blotches symmetrically disposed, one in front of the rhinophores, two behind them, two in the middle of the back, and five in front of the branchiae. The rhinophores are large and grayish. The branchial pocket lies far back; it is wide, open, very shallow, with a transparent floor, and smooth, slightly raised margin. It contains six small scanty greyish plumes, fully everted and set in a semicircle open behind. The anal papilla is large.

The foot is rather broad, rounded at both ends and not projecting behind. The proboscis is protruded and projects from a pore in its anterior margin. No pedal groove or oral tentacles are visible. The mantle margin is everywhere rather narrow.

The internal organs, which are yellowish-white, seem to be as usual in the genus and do not differ from those of *D. vidua* as described by Bergh. No blood gland was discovered. The buccal tube is rather thick and makes an S-shaped bend to the left. The mouth gland is yellowish, folliculate with a fairly long duct. The central nervous system as usual in *Doridopsis*, and with distinct eyes.

The specimen as preserved is remarkably like Garrett's figure (reproduced by Bergh) of *D. vidua*, except that the skin has a more distinctly yellowish tinge and the mantle margin is narrower. Possibly too, the spicules are more numerous and differently shaped. *D. vidua* is recorded from Tahiti, and the locality renders the identification suspicious, as the Californian nudibranchs are not as a rule the same species as those from the South Seas; but the resemblances are so great that I have registered the animal as *D. vidua*. If it ultimately proves to be a separate species, it would seem entitled to Cockerell's manuscript name *D. nigromaculata*.

Doridopsis foedata, Abraham, of unknown habitat, would appear to be a very similar form, but is said to be soft, fleshy, and minutely tuberculate.

***Doridopsis reticulata*, n. sp.**

Pl. vii, fig. 5.

Eight specimens of very various sizes and colours, but apparently belonging to the same species. The living animal is said to have been rather more than 20 millim. long. Many of the preserved specimens are very small, but the largest are 17 millim. \times 7 millim., and 14 millim. \times 9.5 millim. respectively. They are all very flat and irregular in outline, and can probably alter their shape from long to oval. They were captured at San Pedro, California, and one at anyrate on Dead Man's Island. This specimen, when alive, was of a deep chestnut colour, with very numerous white spots. The branchiae were entirely white, the short thick rhinophores pale orange; the margin of the body was whitish, and the sole of the foot yellowish white.

The preserved specimens vary in colour from yellowish-brown to purplish-brown; in all, the back is covered with small tubercles, which are tipped with white. These white tips and the light mantle border are more conspicuous in the yellowish than in the purplish specimens. The rhinophores are whitish, stout, with about 30 perfoliations and slightly raised sheaths. The branchiae are 5 or 6, conspicuously white and tripinnate. The edge of the pocket is raised, and in most specimens turned outwards. In all, the under-side of the mantle is grey, and displays a remarkable clear white reticulation which looks superficially like the branchiae of *Phyllidia*. It appears, however,

to be formed by bundles of fibres and spicules anastomosing irregularly within the transparent skin. The dorsal integuments also contain long intersecting spicules (fig. 5), straight or Y shaped, more rarely curved, and sometimes striated transversely. They are not visible externally, but can be seen from the inside.

The intestines are white or yellow, but the blood gland which is of a deep purple contrasts markedly with its surroundings. It is single and irregularly lobed in outline. The eyes are very large and black; the central nervous system is concentrated as usual in *Doridopsis*, the different ganglia not being distinguishable, except the buccal pair which are set far back on a constriction of the oesophagus about 4 millim. from the rest. Some previous investigator had opened the anterior portion of all the larger specimens, but the arrangement of the buccal parts though disturbed seemed to be that usual in the genus. The oesophagus is narrow, coiled several times, and dilates into a small spherical pouch just before it enters the liver. The latter varies from chocolate to grey in colour, but in most specimens is hidden by the yellow follicles of the hermaphrodite gland. It is deeply cleft behind. The mucous gland is large and folliculate externally; it partially surrounds the large spherical spermatheca. The spermatocyst is elongate. The ampulla of the hermaphrodite gland is sausage-shaped and very distinct. The glans penis is thickly studded with hamate spines, resembling the teeth of Dorids.

It is possible that this animal is Cooper's *Doris albo-punctata* (Proc. Calif. Acad. Nat. Sciences, 1863, vol. iii, pt. i), but the original type specimens appear to be lost, and the description is so slight that it would hardly be sufficient to identify any species. In some points (e.g. "surface shining, minutely rugose") it is not applicable to the present specimens, unless this phrase is intended to refer to the underside of the mantle, which is not stated. Otherwise, Cooper does not allude to the remarkable reticulation, nor does he say anything about the conspicuous contrast between the white branchiae and the colour of the dorsal surface

Triopha, sp.

One specimen from San Pedro which is much contracted and appears to have lost both its natural shape and colour. As preserved, it is of a uniform grey, 6 millim. long, 3.7 broad and 4 high. There are 8 processes on the frontal veil, and 5 on each side of the body, all low and stout, sub-divided into short thick branches. The branchiae are six; the rhinophore sheaths straight and cylindrical about 1.5 high. The back is quite smooth, and no tubercles are visible.

The jaws are roughly triangular, and composed of short, thick rods of varying shape. The radula is whitish and contains 25 complete rows as well as a few broken ones. There are four rhachidian teeth, very transparent and little developed. The two inner are squarish, the two outer are triangular.

There are only four pleural teeth, of which three are hamate and the fourth low and less perfectly formed. The uncini are 8, and much as described for *Triopha maculata* by MacFarland.

This form does not completely correspond with any of the described species, but as there are no notes on the living animal, and the specimen is ill-preserved and probably immature, it is not advisable to make it the type of a new species.

The known species are :—

- | | |
|--|---|
| 1. <i>Triopha carpenteri</i> , (Stearns) | } MacFarland regards these two as distinct. |
| 2. <i>T. modesta</i> , Bergh. | |
| 3. <i>T. maculata</i> , Mac Farland. | |
| 4. <i>T. grandis</i> , Mac Farland. | |

The genus is recorded only from the west Coast of North America.

***Laila cockerelli*, MacFarland.**

MacFarland: Prelim. account of the *Dorididae* of Monterey, pp. 46, 47.

The type of this form is from Monterey Bay, but numerous specimens obtained by Cockerell agree with it, except that they are smaller, the largest being 12 millim. long and 4 broad. One specimen preserved differently from the others appears to have kept its natural colour. The body is whitish, the numerous spicula being seen clearly through the skin. The tips of all the papillae are of a deep brilliant orange; the five non-retractile branchiae are tipped with the same colour. The dorsal tubercles and rhinophores are of a lighter yellowish orange.

There are about 30 club shaped papillae on each side of the body arranged in thickly set oblique rows containing 2—3 or rarely 4 papillae each. In the centre of each papilla is a column of spicules, which can be seen through the transparent integuments. Two small tubercles stand in front of the branchiae, and others form a row down the centre of the back with a few scattered smaller ones at the sides. The whole dorsal surface is thickly and visibly spiculous, the spicules being usually swollen in the middle, and sometimes almost cruciform. The frontal veil is wide and prominent, bearing papillae like those on the dorsal margin. The anterior margin of the foot is abruptly truncate. On each side of the front part of the body is a short projecting ridge, situated just below the margin of the mantle and running back a little way from the oral tentacles. No trace of mandibles or a labial armature could be found.

The radula consists in the largest specimens of nearly a hundred rows of colourless teeth. The narrow rhachis, which lies in a rather deep groove, bears a single series of flat quadrangular plates. The innermost tooth is simply hamate, slender and very hard to see. The second tooth is large and strong with two hamate cusps; then follow nine or ten uncinat teeth, flattened

and quadrangular. The inner ones bear one or two cusps, but much lower and less developed than in the larger tooth. The cusp gradually decreases and the 3—4 outermost are mere plates. I did not find more than 10 uncini in any specimen. The verge is armed with small irregularly shaped spines.

This form offers a most curious superficial resemblance to an aeolid. Not only are the papillae set in transverse row, but the spiculous axis which they contain, and which is visible through the transparent skin, looks very like the hepatic ramifications found among cladohepatic nudibranchs. The animal is, however, obviously allied to *Triopha*, but is distinguished from it more clearly than *Issa* and *Triopha* in virtue of the arrangement of the papillae, the buccal parts, and the lateral ridges.

***Aegires albo-punctatus*, MacFarland.**

Mac Farland: l.c., p. 45.

One specimen probably from San Pedro, but not to be identified with those in Cockerell's list. Length 10.5 millim.; width across back 4 millim.; across foot 2 millim.; height in front of the branchiae 4.5 millim. The body slopes up to the branchiae and then downwards posteriorly. The head is rather broad, the tail tapering; the integuments are hard and full of spicules, which have mostly the shape of curved rods. The colour is a pale dull yellow, with a few dark spots scattered irregularly here and there between tubercles. These latter are arranged in fairly symmetrical rows, but as there are also tubercles between the rows, the symmetry is not complete. There seem to be three main rows on each side of the central dorsal space, which bears two or three tubercles, and the two innermost unite in front to form one line between the rhinophores. The third line is more or less continuous with the frontal veil, and, as in Alder and Hancock's plate of *Aegires punctilucens*, seems to mark the boundary of the dorsal surface and passes behind the branchiae, but (also as in *Ae. punctilucens*), there are other rows of tubercles below it, and on the tail to the very end.

The oral veil is rather broad, rounded, and as preserved, is drawn down to the sole of the foot. It bears many crowded tubercles arranged irregularly in 4—5 rows. The tubercles vary in size, the larger being about 1.5 millim high, and are cylindrical with flattish tops, bearing a few minute inconspicuous hispid or spiculous processes. The rhinophores are stout, whitish, completely retracted, and with no signs of perfoliation. The right rhinophore pocket is surrounded by four, and the left by five tubercles, of which the outer are the larger, but there are only slight traces of a common rim connecting these tubercles. The branchiae are small, white, tripinnate and bear 4—5 main ramifications. Before each of them stands a large tubercle which bends over the plume, without closing over it as in *Notoloris*. The anterior tubercle is deeply three-lobed; those at the sides four-lobed.

The intestines are whitish, except the liver which is grey. The central nervous system appears to be much as in *Ae. punctilucens* as figured by Bergh.

The buccal mass contains a circular armature of rather thick rods of various shapes, some bent. In the roof of the mouth is a single mandible, bright yellow and roughly square in shape with a blunt triangular point on the cutting edge. The hinder part of it is membranous. The radula is colourless, and consists of 17 rows containing 18 hamate teeth on each side. Near the rhachis they are smaller and crowded, the hook is low and the base long. They increase in size outwards up to the last but one. The outermost of all is rather smaller. They have a wing-like process on the inner margin.

As *Aegires albo-punctatus* is recorded from the Californian coast, the present animal should probably be referred to it, though points of difference are not wanting. The loss of the white dots in a preserved specimen is not surprising, but there are also differences in the shape of the oral veil and branchial valves. But in nudibranchs which bear tubercles and processes these organs exhibit great variation, and it would be unsafe to assume that the arrangement found in a single specimen is specifically characteristic. It is assumed that in saying the pleural teeth of *Ae. albo-punctatus* are similar in form, Mac Farland does not mean to say that the inner ones are not smaller than the rest, as is usual in the genus.

The various species of *Aegires* are not sharply distinguished, and neither this specimen nor the typical *Ae. albo-punctatus* differ materially from *Ae. punctilucens*, except in colour.

The forms hitherto described are :—

1. *Ae. punctilucens*, d'Orbigny.
2. *Ae. hispidus*, Hesse.
3. *Ae. leuckartii*, Verany.
4. *Ae. albo-punctatus*, MacFarland.
5. *Ae. villosus*, Farran.

Dirona, Mac Farland, MS., nov. gen.

Though the following will probably be the first printed account of this remarkable genus, I learn from Prof. Mac Farland, who has most courteously supplied me with much valuable information, that he has been able to prepare a much fuller description based on the examination of many living animals and preserved specimens. It would appear that some time may elapse before his paper is issued, and I, therefore, publish the following notes, which are necessarily imperfect on account of the scantiness of the material at my disposal, but at the same time I preserve his generic and specific names.

The generic characters are as follows :—The animal is aeolidiform in appearance and bears papillae of various sizes, sometimes studded with knobs and ridges, but not containing cnidocysts or hepatic diverticula. It has no oral tentacles, but perfoliate rhinophores without sheaths, and an oral veil without projections. The anus lies on the right side very far back. The jaws are large and smooth. The radula consists of several rows of five teeth each; the central tooth is small; the first lateral denticulate, the second

lateral smooth with a large base and a large sickle-shaped hook. The liver is trilobed, but is wholly contained within the body cavity, and is not ramified. The hermaphrodite gland consists of several separate lobes lying on the front part of the liver. According to MacFarland, the glans penis is armed.

In some respects, such as the structure of the frontal veil and of the hermaphrodite gland, this animal resembles *Scyllaea*, and perhaps the knobs on the papillae may represent branchiae. In others, particularly the absence of rhinophore sheaths, it approaches the *Aeolids*, and in general appearance is not unlike *Protonotus*. But the undivided liver is remarkable in conjunction with the other characters, and both the position of the anus and the dentition are peculiar.

The genus will probably be made the type of a new family. At present two species are known:—

1. *Dirona picta*, Mac Farland, California, described below.
2. *D. albolineata*, Mac Farland, California. Prof. Mac Farland states that this animal is of a beautiful, translucent grey, save for a narrow band of pure white edging the veil, the cerata, and the caudal crest; also a similar line running down the stalk of each rhinophore and meeting in the median line. Cerata smooth, radula about $32 \times 1.1.1.1.1.$

***Dirona picta*, MacFarland.**

Pl. vii, figs. 6—11.

The animal which was obtained at Dead Man's Island, San Pedro, measures 19 millim. in length and 7 in breadth: the height to the dorsal surface is 5 millim. and to the tip of the highest papilla 9. The length includes the buccal mass which is everted. The colour is whitish but the greenish viscera can be seen through the integuments, and the back and sides show traces of reddish brown pigment. The living animal is described as having brown sides with rather sparse, small, yellowish spots. From a sketch of the dorsal markings it would appear that yellow predominated in this region and that the brown colour was represented only by a reticulate pattern (figs. 6 and 7).

The animal is stoutly built. The foot is broad and slightly expanded in front, where it is rounded, without a groove or lateral angles. The back is flat and minutely tuberculate. The margin is not prominent but is marked by a line of papillae of which there are about 15 on each side and one or two over the tail. They are mostly minute but some are as much as 2 millim. high. The line is generally single but double in some places. Besides these papillae there are a number of much larger ones about 4 millim. high, many of which have become detached, so that it is difficult to be certain what was the original arrangement, but it would appear that there were about 5 on each side within the line of smaller papillae, and that the largest of all were at the end of the body. They are deciduous, somewhat

ovate in shape (4 millim. \times 3 millim.) constricted at the base but tapering suddenly to a pointed tip, though this feature is not visible in the drawing. On the inside they bear a number of small prominences, at least two rows of ten each, connected by ridges. The structure is not very plain but may represent some form of branchia though this is not suggested by Cockerell's sketch (fig. 8).

In front of the rhinophores is an oral veil, 1.5 millim. wide at its broadest part. It is undulated but shows no processes or distinct tentacular prolongations. There is no trace of tentacles near the mouth. The rhinophores are stout (3 millim. \times 2 millim.) and deeply but somewhat irregularly perfoliate. They are much contracted but look as if they had originally had a process or sharp point in front. They have no sheaths and are apparently not retractile, for though there is a slight hollow at their bases it looks as if they could not be withdrawn into it. The genital orifices are about 3 millim. behind the frontal veil, inconspicuous and without folds. The vent is at the extreme posterior end of the right side. It is very wide but not very prominent.

The central nervous system is yellowish and very distinctly granulated. The eyes are large, black with a reddish lens and set on long stalks. The cerebro-pleural ganglia show a very distinct division: in fact in the preparation the two parts are separate, but this is perhaps not natural. The pedal ganglia are below them and applied to the sides of the oesophagus.

The jaws are yellow, not denticulate, and apparently bear three ridges, arising near the hinge. They seem however somewhat crumpled and perhaps have been injured owing to the eversion of the buccal mass. The formula of the colourless transparent radula is $22 \times 1. 1. 1. 1. 1.$ In the middle of the wide naked rhachis is a small elongate central tooth (fig. 9) bearing a longish straight spine. With the highest power, traces of one or two denticles seem visible at the base of this spine in some teeth, but they are very small. The first lateral (fig. 10), which is a considerable distance from the central tooth, is somewhat as in *Coryphella*, hamate, with a longish base and 6-8 distinct denticles. The second lateral (fig. 11) has a very long base and a large curved hook, blunt and not denticulate.

The oesophagus passes under and into the liver, which is dark green, and appears superficially to be a single solid mass, but on examination is seen to be trilobed, one of the lobes being slightly bifid. No diverticula or branches are visible, though there are holes in the surface of the liver whence they might have issued. But no diverticula can be detected in the papillae by either sectioning or squashing. The substance of the papillae seems to be homogeneous and only slightly yellower in the centre than outside. It is certain that they do not contain a column of green substance analogous to the liver. No cnidocysts could be found. Enclosed in the liver is a thin, membranous, almost transparent stomach with a few internal laminae. This and the intestines are full of gritty matter and many small

spines, which may either represent a stomachic armature or be merely the remains of some animal which has been swallowed. They were not observed in any place to be clearly arranged on the walls of the stomach. The liver is deeply grooved to receive the intestine which is whitish. It runs low down at the side of the liver and turns upwards at the end of the body.

On the anterior surface of the liver are seven yellowish grey lobes which appear to constitute the hermaphrodite gland though they are so much hardened that the structure cannot be clearly seen. In any case they do not form a layer over the liver, nor do they extend to the posterior part of the body cavity. The genitalia are not well preserved, and, as it would seem, not fully developed. The mucous gland is of moderate size and the spermatheca appears to be elongate. The distinct, yellowish renal syrxinx lies at the side of the intestine.

Prof. MacFarland informs me that this species found by Mr. Cockerell at San Pedro is common at Pacific Grove. The living animal is of a light brown, plentifully besprinkled with fine lemon yellow spots, and with a single pink spot at the base of each papilla. The shape of the living animal is represented in figure 8a. In alcohol it becomes unnaturally high and square and the thin expanded edge of the foot is lost. It further appears from Prof. Mac Farland's notes that the glands penis is armed but not the stomach, so that the spines found by me must be part of some animal which had been eaten, and that the undivided character of the liver is constant in all specimens.

Janolus, Bergh.

This genus, which was created by Bergh for *Janolus australis* obtained by the Challenger in the Arafura Sea, differs from *Antiopella*⁽¹⁾ (*Janus*) in having large smooth jaws and a very wide foot with an expanded margin. *Antiopella hyalina* has been shown by Bergh to be referable to this genus and a new form is here described, so that the known species are :—

1. *Janolus australis*, Bergh.
2. *J. hyalinus* (A. & H.).
3. *J. coeruleopictus*, n. sp.

Janolus coeruleopictus, n. sp.

Pl. viii. figs. 12—16.

Found at Dead Man's Island, San Pedro, California. The notes on the living animal say that it looked like a mass of speckled jelly, and that the cerata were very easily deciduous. The colours are to be gathered from the sketches (figs. 12, 13).

1. For this nomenclature (*Antiopella* = *Antiope* = *Janus*) see Hoyle, Journ. of Conchology, 1902, p. 214.

The single preserved specimen is stoutly built. It measures 7 millim from head to tail, but this represents at least 10 millim., as the body is considerably bent. The height is 4 millim., the breadth 3.5 across the back and 5 across the foot. The buccal mass is exserted and the anterior end of the animal somewhat distorted, but there appears to have been a fold over the mouth with a distinct cylindrical tentacle on each side. Behind this are the rhinophores, large, stout, almost spherical, 2 millim. high, with about 15 deep perfoliations and slight cavities not amounting to pockets at their bases. Between them is a crest which may be described either as two tubercles, or one tubercle indented in the middle. The body bears at present only a single line of minute cerata, which are evidently in the first stage of growth. There are 25—30 on each side, and about six in front of the rhinophores. Loose in the bottle are five stoutish conical cerata 3.5 long, with a yellow ring below the tip. Their outline is rather irregular but they do not bear distinct knobs. I have seen living specimens of *Antiopella cristata* at Plymouth in a similar condition. In the *Janulae* the cerata are very caducous and easily lost but also easily renewed. It is probable that the present animal in its perfect state was covered with cerata similar to the large ones now detached.

The anal papilla is large and cup-like, medio-dorsal and behind the pericardium. The genital orifices are far back and surrounded by moderately strong folds. The verge is exserted, very long, nearly 4 millim., conical but sinuous, pointed but unarmed. The foot is broad, straight in front; no notch or groove is visible, but it was perhaps connected with the lateral expansions of the head, though it is hard to tell from the preserved specimen. The lateral margins of the foot are ample and undulated. The tail is not long.

The buccal mass is long and rather compressed. Its sides are enclosed by the yellow jaws. They are very large for the size of the animal (length 3.5, breadth 1.7), triangular, with a ridge down the middle of each side, and striated. The edge is not denticulate, but presents a minutely tessellated appearance near the hinges. The radula consists of sixteen rows, and the maximum formula appears to be 16×27 . 1. 27. The teeth are transparent, much bent and crowded, especially near the rhachis. It is probable that there is a median tooth in all the rows, but owing to the crowding and irregularity of the other teeth it is often impossible to discover it. The teeth are stout, low and hamate near the centre of the rows (figs. 14, 15), and have long bases. Further from the rhachis they become taller, more slender with smaller bases and more erect (fig. 16), only the outermost being again short. On a few teeth near the rhachis can be seen 3—4 small ridge-like denticles quite at the base of the hook. The remaining teeth are smooth.

The internal organs are not well preserved. The alimentary tract could not be satisfactorily traced, but as far as it could be followed seemed to correspond with the descriptions of *Antiopella cristata*. The cerata contain yellowish diverticula which bear two or three knobs or branches at the tips, where the yellow rings are visible externally. The hermaphrodite gland is large, and

consists of many white follicles ; the mucous and albumen glands large ; the spermatheca strong and rather elongate. The central nervous system is very strongly granulate ; the cerebro-pleural ganglia are elongate, the pleural rounder.

***Hermisenda opalescens* (Cooper).**

Bergh : Explor. of Alaska, Nudibr. I, p. 138.

Cockerell is probably correct in referring to this species, a number of specimens found at San Pedro and in regarding it as identical with the *Eolis opalescens* of Cooper from San Diego, although Bergh's specimens from Alaska were much smaller and there were some discrepancies in colour.

This nudibranch was found abundantly on mud flats at low tide in San Pedro harbour on July 19, 1901, and attained a length of 42 millims. The papillae were arranged in thick groups and were deciduous. The tentacles and sole of the foot were of a beautiful opalescent blue and a stripe of the same colour ran down the middle of the back, bifurcating anteriorly so as to enclose an oblong area of bright orange. In some individuals there was a similar orange area in the middle of the back. Some pink internal organ could be seen through the integuments, and there was a broad orange stripe on each side of the head passing backwards from the oral tentacles. The cerata were yellowish with bluish tips, and the hepatic diverticula varied in colour from purplish to very pale brown, the lighter colour being the commoner (figs. 17, 18, 19).

The preserved specimens are of a uniform pinkish or violet grey ; the length varies from 15 to 20 millim., the breadth across the cerata at the widest part from 7 to 9. The external and internal characters seem to agree with Bergh's description, allowing for the difference of size.

The cerata are set in four or five thick groups, of which the first and second are somewhat raised, the others less distinctly so. The innermost cerata are largest, the outermost very small. The foot is broad, thickened and grooved in front, and produced into grooved tentacular angles. The tail is long and thin, extending 5 millim. behind the cerata in large specimens. The rhinophores bear about 20 distinct perfoliations. In several specimens the oral tentacles simulate perfoliation in a remarkable manner, but the phenomenon is apparently due to contraction as in other specimens they are smooth and simple.

The jaws are yellowish and bear a line of pointed denticles which are themselves serrulate in the hinder part. The radula consists of about 25 yellowish teeth with 4—6 longish, curved denticles on each side of the central cusp. These denticles are sometimes irregularly shaped or bifid. The under side of the central cusp is irregularly serrulate, the serrulations, though not always easy to see, amounting to at least ten. Bergh mentions that a layer of rather short sacculate glands filled the end of the penis

around the orifice. In some of the present specimens the organ is exerted, and it seems clear that there are four or five rows of round glandular nodules at the base of the terminal portion, set about one third of the way down the whole organ, which is very long. The circuit is interrupted in one part by a triangular flap of skin which itself bears nodules.

In this genus the denticles on the edge of the jaw are themselves serrulate, and the central cusp of the teeth is serrulate on the under side, both of which characters (though referring to somewhat minute details) are unique in the hitherto described *Aeolidiidae*. Otherwise the *Hermisenda* is closely allied to *Facelina* and *Facalana*, and perhaps the three should be regarded as a single genus. The round glands on the verge recall those found on the same organ in *Facalana*.

Spurilla, Bergh.

This genus resembles *Aeolidiella* in its general shape and bilobed, pectiniform teeth, but differs in having perfoliate rhinophores, though there would seem to be a rudimentary perfoliation in some species of *Aeolidiella*. For instance, Vayssi re states that the rhinophores of *Ae. glauca* are "munis d' un sillon spiral." Four species of *Spurilla* are known, namely:—

1. *Sp. neapolitana*, (Delle Chiaje).
2. *Sp. sargassicola*, Bergh.
3. *Sp. inornata*, Vayssi re.
4. *Sp. chromosoma*, n. sp.

***Spurilla chromosoma*, n. sp.**

One specimen from Deadman's Island, San Pedro, where it is said to be found on rocks between tides. According to the notes on the living animal, the body is of a ruddy colour, with a row of white marks on the back, the cerata greenish with white tips, and the oral tentacles remarkably strong and large. It is mentioned that the cerata are easily deciduous, and they are almost entirely lost in the preserved specimen. It is much bent, but would be about 15 millim. long if straightened out, stoutly built but with a long tail. Traces of the ruddy colour can be seen in the anterior part of the body. The anterior corners of the foot are considerably produced but bent downwards. The oral tentacles are still unusually long and stout. The short, thick, pinkish rhinophores bear about ten oblique perfoliations. It is not possible to say what the arrangement of the cerata was. The few that remain are very small.

The buccal parts are everted, and the interior of the cavity is seen to be covered with small tubercles. The jaws are yellow and no denticles could be found. The radula consists of 19 yellow pectiniform teeth, distinctly bilobed and arched, not flat. There are one or two central denticles lower than the rest, and on each side of them from 25 to 32 long, thin lateral denticles, the points of which are often broken off. No genital armature was found.

This animal approaches very nearly *Sp. neapolitana* which has a similar coloration, large oral tentacles and transversely laminated rhinophores. The teeth, however, and the front part of the foot present differences, and in view of the habitat the probabilities are in favour of the species being distinct. But the close resemblance between several Californian and European nudibranchs is remarkable.

Phyllobranchopsis, nov. gen.

The specimens on which this new genus is founded are so badly preserved that many important characters remain uncertain. With the aid of Mr. Cockerell's sketch however (figs. 20, 21) the following points can be established. The radula is ascoglossan and closely resembles that of *Hermæina*, Trinch.; there are no jaws and no oral tentacles: the rhinophores appear to be as in *Hermæa*: the margins of the back bear one or two rows of flat leaf-like appendages, as in *Phyllobranchus*. The digestive system and hepatic diverticula seem to be as in *Hermæa* and no trace of a buccal crop can be found, though in view of the maceration of many of the internal organs, its absence cannot be regarded as conclusively demonstrated. The vent could not be found.

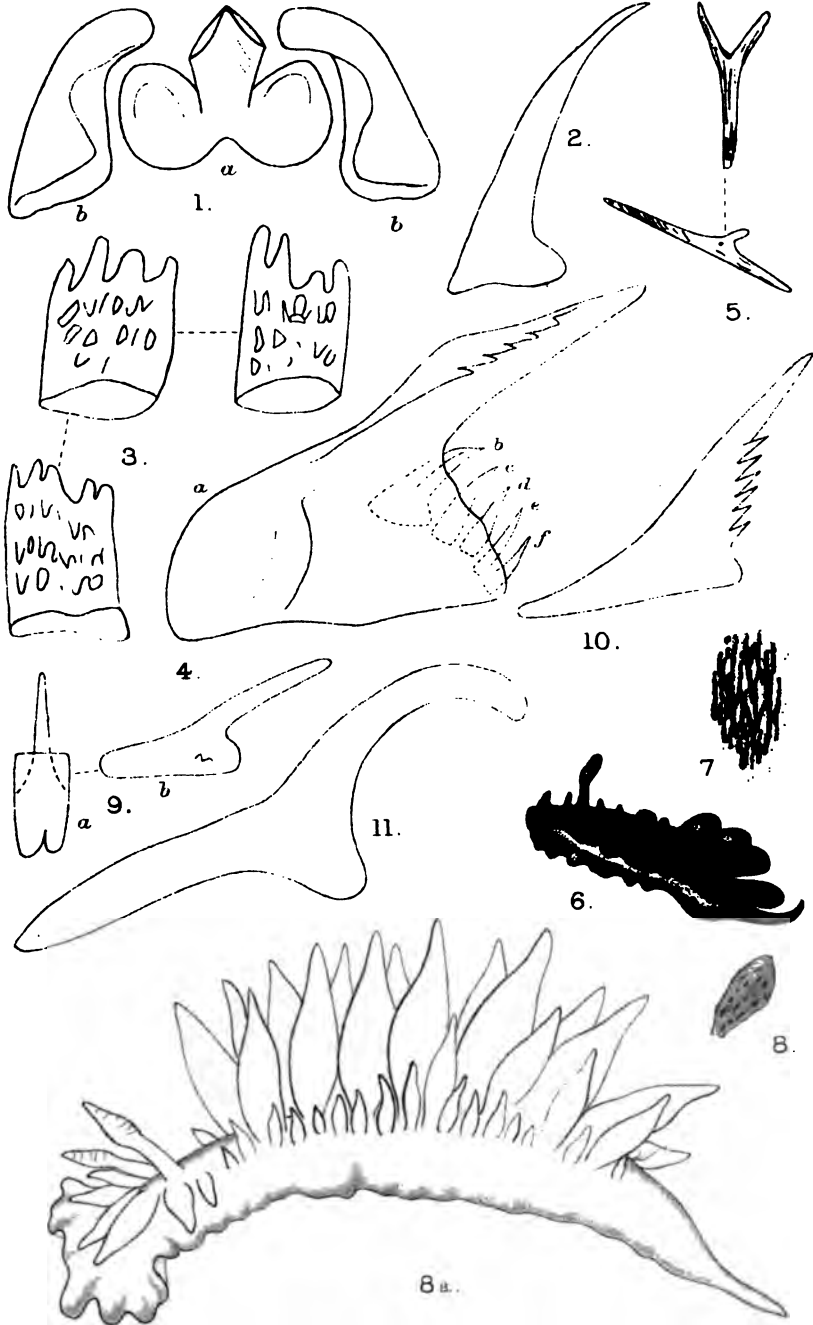
The animals offer many resemblances to *Caliphylla*, but differ in (1) their stouter shape, (2) the small number of cerata, (3) the radula, (4) the arrangement of the hepatic diverticula in the cerata, and (5) the apparent absence of the crop. It appears best to regard them as a new genus belonging to the *Hermæiidae*, but in many ways intermediate between that family and the *Phyllobranchidae*.

Phyllobranchopsis enteromorphae, gen. and spec. nov.

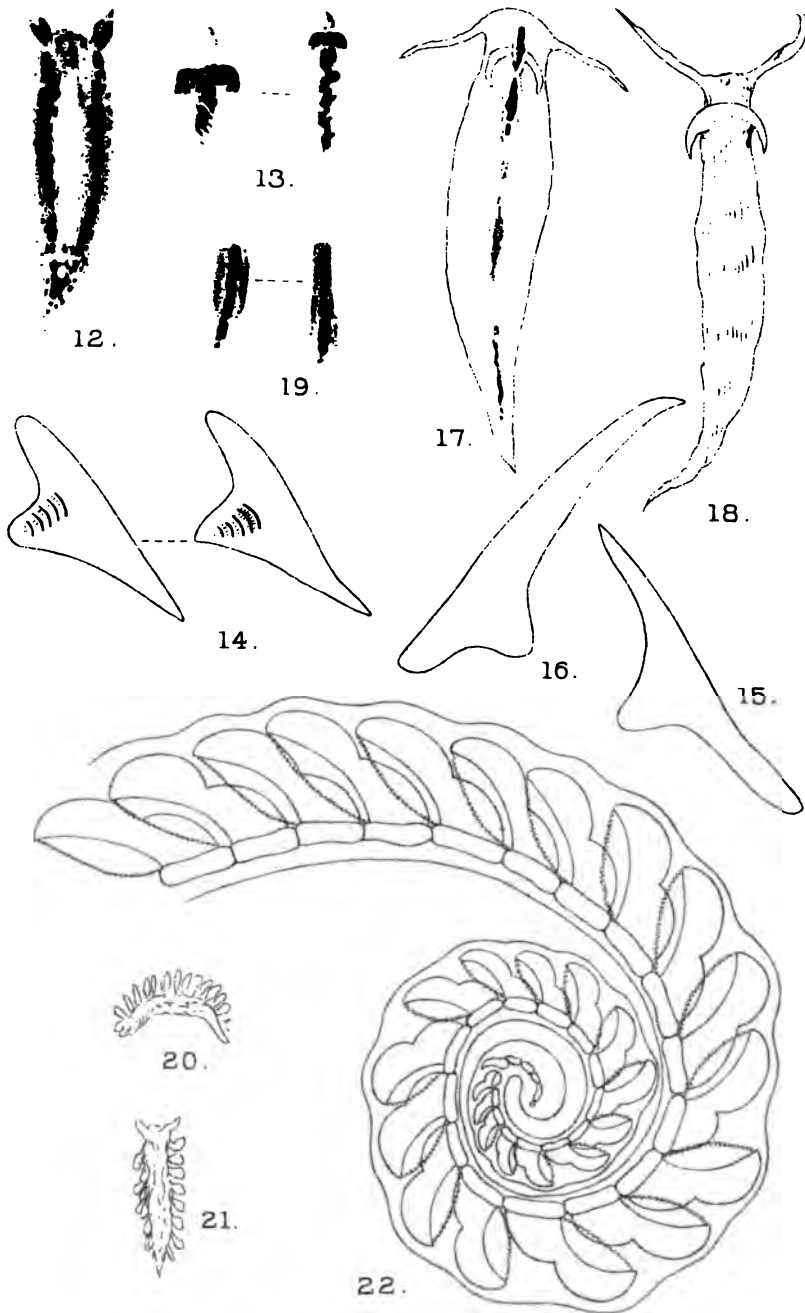
Pl. viii, Figs. 20—22.

Four specimens found on *Enteromorpha* in small rock pools near high water mark or Dead Man's Island, San Pedro, July, 1901. The living animals are described as greenish yellow, with black mottlings on the sides. The eyes were very distinct and set on small pale patches, the head and neck being black. The animals were about 5 millim. long.

All the specimens are badly preserved and much macerated, so that it is impossible to be certain about many of the most important external characters. They are all greenish-white with an irregular black marbling, distributed in varying proportions on the sides, head, tail and rhinophores, but not on the foot or back. The cerata are whitish and flat as in *Phyllobranchus* with sinuous but not denticulate edges. The largest are 2 millim. long and 1 millim. wide. They appear to be arranged in a single row, but large and very small cerata are sometimes found close together and may represent two rows. They are easily caducous and many have fallen off. Within them can be seen greyish cells, only slightly darker than the surface



Hath, Lith. London



Huth, Lithr London

tissue arranged in a loosely ramified flocculent pattern. They also contain large white cells and in some cases a few bands of purplish cells.

The foot is as broad as the body (not divided transversely) somewhat expanded in front and with a thickened anterior margin. It extends a little in front of the mouth which cannot be seen ventrally. The tail is pointed but not very long. No oral tentacles could be found. The rhinophores are injured but appear to be pointed as in *Hermæa*. The pericardium is not equally prominent in all specimens, but appears to be oval.

The eyes are large and distinct: the ganglia of the central nervous system are granulate, but their arrangement could not be clearly seen. The buccal mass is rather small, white and not striated. No sign of jaws or crop could be seen. The number of teeth in the radula (fig. 22) varies from 35 to 56. They are arranged in a spiral of about 4 coils, the used teeth retaining their position and not falling into a heap. The size increases rapidly going backwards. In the largest radula there are 4 rudimentary teeth without a hook, 15 small, 12 moderately large, and 25 full sized. All but the rudimentary teeth have a deep indentation in the back and a spoon-shaped cavity at the end, across which runs longitudinally a thin lamina bearing a row of numerous fine denticles. They closely resemble those of *Hermæina maculosa*, Trinch. No armature could be found in the reproductive organs.

C. ELIOT.

DESCRIPTION OF PLATES VII. & VIII.

- | | |
|--|--|
| 1. <i>Tritonia palmeri</i> . | <i>a</i> . Median tooth, <i>b</i> . first lateral. |
| 2. " " | An ordinary lateral tooth. |
| 3. <i>Acanthodoris rhodoceras</i> . | Elements of labial amature. |
| 4. " " " | Half a row of the radula. <i>a</i> . first lateral, <i>b</i> .— <i>f</i> . remaining laterals. |
| 5. <i>Doridopsis reticulata</i> . | Spicules. |
| 6. <i>Dirona picta</i> . | A living specimen which has however lost most of its cerata. |
| 7. " " | Dorsal markings. |
| 8. " " | One of the cerata. |
| 8A. " " | Living animal, drawn by Prof. Mac Farland. |
| 9. " " | Median tooth. <i>a</i> . from below, <i>b</i> . from side. |
| 10. " " | First lateral. |
| 11. " " | Second lateral. |
| 12. <i>Janolus coeruleopictus</i> . | Living animal without cerata. |
| 13. " " | Two cerata. |
| 14. " " | Teeth near the rhachis. |
| 15. " " | Teeth nearer the centre of the half row. |
| 16. " " | Teeth nearer the end of the row. |
| 17. <i>Hermisenda opalescens</i> . | Animal from above without cerata. |
| 18. " " | Animal from below. |
| 19. " " | Two cerata. |
| 20. <i>Phyllobranchopsis enteromorphae</i> . | From the side. |
| 21. " " | From above. |
| 22. " " | Radula. |

THE GENUS CATAULUS, WITH DESCRIPTIONS OF NEW FORMS.

By E. R. SYKES, B.A.

Some years ago I gave (Proc. Malac. Soc., vol. iii, p. 66) a list of Ceylon forms of this genus known to me.

Recently I have examined the greater portion of the specimens belonging to this group which formed part of Hugh Nevill's collection. Several species appeared to me undentifiable with any known form, and a few of these have recently been described by Mr. Fulton, unfortunately without any figures. Four new names are now proposed, and I thought it might be of interest to bring the list of Ceylon forms that I published some seven years ago up to date. Since that time the generic name has been discussed by Dr. Kobelt and myself (¹), and a note on the anatomy has been published by Miss Digby (²); the residue of the notes are referred to directly in the following pages.

Insular faunas are prone to include a number of closely related forms belonging to a single group and the problem of the specific value of these forms is an exceedingly difficult one. Until the anatomical characters of the races of *Cataulus* are investigated, the decision as to whether characters found in the shells are varietal or specific must be based on general experience in dealing with specimens and also from a comparison of fairly lengthy series.

The figured specimens are in my collection.

***Cataulus aureus*, Pfr.,**

In my paper I placed *C. leucochilus*, (Ad. and Rve.) Sby., as a synonym. Recently a number of specimens of the form now described as *C. smithi* have been distributed under this name and I have therefore again investigated the matter. I feel no doubt that my original decision was correct and that the figure given by Sowerby—no description having ever appeared—was taken from a specimen of *C. aureus*, very probably one of those in the British Museum. It may be remarked that the name *aureus* does not occur in Sowerby's list, and the Museum tablet has been so labelled in fairly recent times, having previously born the appellation of a variety of another species. Very possibly Sowerby noticed this and perceiving it was erroneous, he published the name *leucochilus*.

1. Thierreich, Cyclophoridae, p. 281; J. Malac., Vol. x, p. 2.

2. Proc. Malac. Soc., Vol. v, p. 261.

Cataulus austenianus, Benson.

Cataulus blanfordi, Dohrn.

In my view *C. connectens*, Fulton (J. Malac., x, p. 102) is only a local race with a yellow peristome: indeed I have specimens, which I am unable to sever from this species, in which the usual dark red peristome is here white.

Cataulus congener, n. sp.

Cataulus colletti, Sykes.

Cataulus decorus, Benson.

Cataulus eurytrema, Pfr.

Cataulus greeni, Sykes.

C. greeni, Sykes: J. Malac., vii, p. 30.

Mr. Fulton has (J. Malac., x, p. 102) described a var. *robusta*.

Cataulus haemastomus, Pfr.

A variety occurs with a white lip.

Cataulus layardi, (Gray) Pfr.

Cataulus marginatus, Pfr.

Mr. Fulton has described (Ann. Nat. Hist., ser. 7, vol. xiii, p. 453) a variety *crenulata*. I take this opportunity of describing a remarkable variety.

Cataulus nevilli, Sykes.

Mr. Fulton has described (l.c.) a var. *flaveolabris*.

Cataulus nietneri, Nevill.

Two varieties, *unicolor* and *caperata*, were recorded by Collett (J. Malac., vol. vii, p. 85).

Cataulus prestoni, n. sp.

Cataulus pyramidatus, Pfr.

The two forms mentioned by Pfeiffer, seem to occur in all collections.

Cataulus rugosus, Fulton.

Cataulus rugosa, Fulton: Ann. Nat. Hist., ser. 7, vol. xiii, p. 452.

Cataulus smithi, n. sp.

Cataulus sykesi, Fulton.

Cataulus templemani, Pfr.

Cataulus thwaitesi, Pfr.

I am unable to clear up the relationships of this form with the shells described by Pfeiffer under the names of *cuningi* and *duplicatus*, but I incline still to the view that all three are probably varying forms of one species.

DESCRIPTIONS OF THE NEW FORMS.

Cataulus smithi, n. sp.

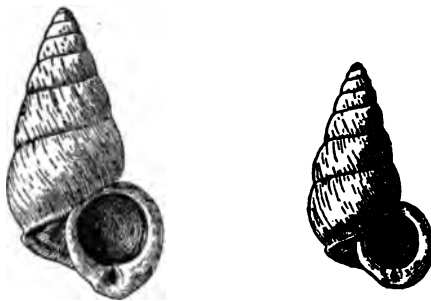
(Fig. 1.)

Shell deeply rimate, solid, straw-yellow, the protoconch a trifle darker, pyramidal, with the spire well raised; the earlier whorls smooth, and the residue sculptured by numerous, closely set, fine longitudinal costulae; suture well impressed; whorls 8, plano-convex, the last being a little compressed in front; umbilical region large, sculptured as the rest of the shell; the umbilical carina is large and distinct, with a second smaller one within; lip white, continuous, sub-circular, slightly projecting at the base, reflected, most noticeably so at the lower outer margin, canal large.

Alt. 26.5; diam. max. (of last whorl) 10.5 millin.

As compared with *C. aureus* the present shell is straw-yellow and not golden-yellow in colour; it is much larger with flatter whorls, the mouth is sub-circular and lacks the angle at the upper right-hand margin, &c. From *C. austenianus* the shape and colour of the mouth and lip, as also the elongate form, will suffice to sever it; similar variations distinguish it from the white-lipped var. of *C. haemastoma*. I would lay stress on the second carina at the base.

The name is given as a trifling recognition of the assistance that Mr. Edgar Smith has always so readily given me on any difficult point.



1.

2.

Fig. 1.—*Cataulus smithi*, n. sp. $\times 1\frac{1}{2}$. Fig. 2.—*Cataulus prestoni*, n. sp. $\times 1\frac{1}{2}$.

Cataulus prestoni, n. sp.

(Fig. 2.)

Shell nearly related to *C. aureus*, but differing in the following characters. Colour straw-yellow rather than golden-yellow; size smaller; whorls not so inflated; umbilical region more rounded; lip not so produced at the base, not so much reflected, and not so 'winged' at the upper right margin: canal smaller.

Alt. 20.8; diam. max. (of last whorl) 8 millim.

Dedicated to Mr. Preston, in acknowledgment of his courtesy in placing at my disposal all the specimens of *Cataulus* he acquired of Hugh Nevill's.

Cataulus marginatus var. **notata**, n. var.

(Fig. 3.)

Shell larger than the typical form ; shape more pyramidal ; whorls more flattened ; longitudinal striation almost absent ; the malleation in the variety is much stronger, especially on the last half of the last whorl, where a second carina, above the normal one, is often present, leaving a smooth area between them ; mouth duplex, pale flesh colour.

Alt. 17 : diam. max. (last whorl) 5.5 millim.



3.

Fig. 3.—*Cataulus marginatus*
var. *notata*, n. var. $\times 2$.



4.

Fig. 4.—*Cataulus congener*,
n. sp. $\times 2$.

Cataulus congener, n. sp.

(Fig. 4.)

Shell elongately pyramidal, rimate, yellow, becoming tinged with red-brown on the earlier whorls, these latter are smooth, while the rest of the shell is closely, finely, longitudinally striate ; suture well impressed ; whorls $7\frac{1}{2}$, convex ; umbilical region moderate in size, sculptured as the rest of the shell ; aperture sub-circular ; lip white, double, the outer part well reflected and thin at the edge, slightly produced at the right upper margin, the inner part circular and produced ; basal canal small, the carina being whitish.

Alt. 16.5 ; diam. max. (last whorl) 6 millim.

Resembling in form a dwarf *C. aureus*, but separable by *inter alia*, the shape of the outer lip, and the duplication of the lip, as also by the small basal canal.

BIONOMICAL CONSIDERATIONS IN GASTROPOD EVOLUTION

By J. R. AINSWORTH DAVIS, M.A.,

Professor of Zoology in the University College of Wales, Aberystwyth.

Without pre-judging the question of Molluscan affinities, or speculating in detail on the characters of the "Archi-Mollusc," there seems good reason for believing that this was a flattened, fairly elongated, creeping type, unsegmented, and probably devoid of an extensive coelom. The creeping habit would be associated with a tendency to increased muscularity of the ventral body-wall, while—as a protective adaptation—the dorsal integument would be more or less strengthened by calcareous secretion. Whatever may have been the exact nature of the "prae-archi-mollusc" it almost certainly respired by the general surface of the body, and as the gradual specialization of both ventral and dorsal surfaces in the manner indicated must have involved a reduction in respiratory efficiency, it is easy to conceive the *pari passu* development—by the selection of favourable variations—of dorso-lateral folds of integument, as a means of compensation. We are thus enabled to construct a plausible hypothesis of the way in which the inception of two primary Molluscan characters—i.e. muscular ventral body-wall and skeletogenous dorsal integument—naturally led to the acquisition of a third characteristic feature—the possession of a *mantle*. The space roofed over by the mantle flaps would be the *mantle cavity*, part of this being destined to deepen into a *branchial cavity* at a later stage in evolution. From some such type as that partially described it is easy to derive the Placophora (*Chiton*, &c.) by further specializations; and perhaps the Aplacophora (*Proneomenia*, *Nomenia*, *Chaetoderma*, &c.) may have arisen from an earlier stage in the evolutionary history of such a type, though the possibility of degeneration must here be taken into consideration.

The lines upon which *Chiton* has evolved have evidently been determined by the habit of clinging to stones, and creeping slowly over their surface to browse upon adherent algae. The comparative length of the foot suggests that it has to do a good deal of creeping, and the observation of living Chitons in aquaria proves that this is actually the case. It is with the upward transitions from the Chiton-type that this article proposes to deal.

Those who have watched the slow progress of a *Chiton*, and compared it with the relatively agile Periwinkle (*Littorina littorea*), cannot fail to have realized that the more primitive animal is undoubtedly delayed in its movements by the fact that shell, viscera, and foot, are all practically co-extensive for the entire horizontal extent of the body. And we can

understand the evolution of forms creeping with greater rapidity, by the selection of variations tending to the aggregation of the viscera away from the muscular foot. Hence most probably the development of the "visceral hump", which plays such an important part in Molluscan morphology.

In some of the descendants of the Chiton-type (not of the Chitons, which of course have specialized along their own lines), the acquisition of a more actively creeping habit would seem to have been associated with the development of such a hump, postero-dorsal, in position, but as life beneath stones necessitates a considerable amount of lethargic clinging, we may suppose the hump to have been symmetrical and median. Some of these forms were also probably acquiring the widespread habit—especially among Gastropods—of creeping against the surface-film of fairly still water, with their bodies immersed, and in such forms the symmetrical disposition of the main weight of the body, i.e. of the visceral hump, would be accentuated. For here again we have a variety of the clinging habit, and as the creeping organ which supports the weight is necessarily symmetrical about the axis of progression, the weight itself must also be symmetrical. Otherwise a couple would be brought into existence, tending to turn the animal out of the plane in which its foot could cling.

Other types, probably coming off nearer the root of the Molluscan evolutionary tree, would seem to have extended their wanderings from their first home on the under side of stones to the floor of the spaces underneath the boulders of the shore, afterwards leaving the surface and ploughing their way into the gravel, sand and mud. We may thus picture the first beginnings of the Pelecypoda, which have acquired their characteristic shape—as is generally admitted—by a narrowing and deepening of the primitive Molluscan body. The burrowing Scaphopoda probably arose from the stage in which a postero-dorsal visceral hump had already begun to develop, and the gradual hypertrophy of the anterior musculature is readily intelligible.

We will now return to the Chiton-type in which the viscera were collecting into a symmetrical postero-dorsal visceral hump. This probably possessed a protective covering in the form of a cap-shaped shell, beyond which the foot stretched freely backwards, the upper surface of this posterior extension beginning to be chitinized as a protection against the rubbing of the shell-edge, and presenting the first stage in the evolution of an operculum, though as yet with only one of the functions of that organ. Such a type would be able to creep with fair activity, not only under but also around and upon boulders, and it would probably also make use of surface-tension for crossing fairly still tide pools. A type like this may be imagined as corresponding to the common stock from which both Cephalopods and Gastropods have originated. The creeping by surface-tension was probably associated with a certain amount of parachuting—when the hold of the surface-film was lost—and in this may very

likely be seen the first beginning of the swimming-habit, which is now so characteristic of Cephalopoda. The long axis of the visceral hump was already directed postero-dorsally away from the head, and the body would tend to dispose itself symmetrically about this incipient swimming-axis, in the most convenient manner for swimming. Extensions of the body diverging from the axis would gradually diminish, and this enables us to understand the disappearance of the foot-sole, with concomitant hypertrophy of the ventral musculature below and around the mouth. It is very probable that there were lateral muscular extensions, possibly of use for parachuting, and most likely also of sensory value. These extensions have persisted in the Cephalopods as the *funnel*, and in many Gastropods as *epipodia*. It is interesting to observe that the "parapodia" of *Aplysia*—regarding the morphological value of which no opinion is here expressed—are lateral muscular flaps used both for parachuting and swimming. The main lines of adaptation—as regards external form—have now been briefly sketched out for the prototypes of the Cephalopoda, and a similar attempt will next be made for the Gastropoda. It is necessary to begin by an account of the probable general lines of evolution of the branchial cavity.

The blood-stream of primitive Molluscs flowed forwards in the gut-wall to the head—the most important region—so that a deficiency of blood was continually being created just beneath the postero-dorsal integument, to which there would, therefore, naturally be an inflow from the other parts of the body. For this reason the posterior integument on either side of the middle line—in the region of the rectum and anus—early acquired special respiratory value, though the present writer does not attach any particular importance to the exact homologizing of respiratory outgrowths in different types. At any rate, as general width was reduced as the outcome of a more active habit, there was a specialization of such outgrowths at the back, and one or two gills (ctenidia) increased in size, that part of the mantle-cavity sheltering them deepening *pari passu*, and becoming a true *branchial cavity*.

The anus was median and posterior, remaining so notwithstanding the development of a branchial cavity. The incurrent respiratory water-streams, coming in on the sides bathed the ctenidia, and then coalesced into an excurrent stream, flowing past the anus, and flushing the branchial cavity. Whatever the exact original position of the excretory openings, it was at any rate more or less posterior, and not very far from the anus. By selection of variations these openings were gradually shifted back towards the median plane, i.e. nearer the excurrent stream, by which their deleterious products were washed away. It is characteristic of Cephalopods that the left side is of predominant importance as regards sexual products, i.e. the one gonad when—as in most cases—only one exists, is the *left*. The same is true for Gastropods, where the gonad primitively expels its products through the morphologically left kidney, so that the excretory outlet of the gonad-possessing side, i.e. the left, must have been of predominating importance.

Since the branchial cavity was not very wide, the excreta would tend to soil the gills to some extent, especially in forms which came more or less out of the water, or were left uncovered by the tide, so that the respiratory streams—and consequently the flushing of the branchial cavity—were temporarily suspended. The left side being predominately excretory the gill of that side would naturally be more soiled than its fellow, which would acquire added importance in this way. If now the branchial cavity were shifted even to a very small extent up the right side of the animal, the more important right ctenidium would be correspondingly raised, and thus freed to some extent from pollution. The consequent loss of symmetry would be of no great moment to a form creeping out of water or, generally, over rocks and weed.

An upward shifting to the right would also be of advantage in another way. For a symmetrical postero-dorsal visceral hump would tend to lag behind, bringing the edge of the shell down on the chitinized upper surface of the hind foot, and thus partly or completely closing the opening of the branchial cavity. We find therefore those variations were selected which have ultimately raised the branchial cavity up the right side to the antero-dorsal region of the body.

The earliest Molluscs undoubtedly clung to the rocks as a protection against the wash of the tide and the buffeting of the waves, but this became more difficult as the evolving Gastropods began to wander actively over reefs and boulders. Under these circumstances the habit seems to have gradually become more marked of retracting as much of the body as possible into the cap-like or slightly symmetrically coiled shell. The head would be first drawn in, to be followed by the front part of the foot, but the posterior extension of that organ would be too long to be simply drawn in, and would therefore be flexed on itself, its chitinized dorsal surface thus coming to lie in the mouth of the shell. From this stage onward the gradual specialization of the chitinized area into an operculum must necessarily have followed, and it would seem that we are justified in regarding this structure as a very ancient one.

We know that the shifting of the branchial cavity profoundly modified internal arrangements, and greatly disturbed their original symmetry, so it is possible that the external symmetry was simultaneously affected. As the branchial cavity was shifted in a counter-clockwise direction, it is likely enough that at least the outer whorl of the slightly coiled shell acquired somewhat of a tilt to the left. External symmetry, however, would probably not be greatly modified at this stage, as the still important clinging and—probably—surface-tension creeping habits would militate against large alterations of the kind.

The early Gastropod was attached to the cap-shaped shell by means of a muscle taking origin in the apex of the latter. But as the branchial cavity shifted and many of the viscera moved or twisted round with it, this muscle

would be subjected to torsion, besides which its efficiency would be greatly reduced when it had to work round the considerable curves due to increase of coiling. At the same time certain antero-lateral connections between the mantle and the body-wall became of increased importance. Muscular strands running from the shell through the mantle into the body-wall developed into pillars going from shell to foot. They held up the shell and visceral hump when the animal was extended, and served as pedal retractors. The shifting branchial cavity would need to accommodate itself to the right moiety of this muscular development, acquiring a position either to the left and in front of it, or to the right of and behind it. The former arrangement is the one that has actually come about, probably either because of the still considerable importance of external symmetry, or because of the inconvenient width associated with a lateral branchial cavity. At all events the branchial cavity became anterior, and was bounded on either side by a *shell-muscle*, as we may now call the pillar-like structures to right and left.

In the shift of the branchial cavity round the right side, from a postero-ventral to an antero-dorsal position, what was at first on the right became secondarily left, and what was primarily left acquired a position on the right. The important right ctenidium of the primitive Gastropods thus became shifted over to the left front, and most existing species possess this one only, its fellow having disappeared. An exception to this is, however, afforded by a few very primitive types, which have evolved on quite special lines, as primitive types and survivals so often do.

The muscular pillar on the left side of branchial cavity—in its new anterior position—would tend to obstruct the none too free entrance to that cavity, just at the place where the free entry of water to the important ctenidium was of prime necessity. And hence this muscle has disappeared from most Gastropods, except the *Fissurellidae*, *Docoglossa*, *Haliotis*, and *Scissurella*. The gradual diminution of the said muscle would involve the sagging of the hump on the left side, increasing the slight tilt in this direction already mentioned, so that the outer whorl would go back in an almost horizontal plane, instead of a nearly vertical one.

Meanwhile the habit of retraction became more and more accentuated, and it was perfected by the substitution of a single shell-muscle taking origin fairly far back in the shell, as against a pair of muscles attached near its mouth. The evolution of the habit was also associated with a lengthening of the shell-cavity. This of course meant extra coiling, and if the coils remained pretty much in one plane the shell would acquire the form of a broad flat spiral, projecting in an inconvenient way on either side of the animal. It is, therefore, intelligible that variations in the direction of a conical spiral should have been selected, and why the shell of an average existing Gastropod should be of this shape. In it the centre of gravity is near the median plane, and as the morphological (pre-torsional) right side of the shell-cavity remains central throughout, the shell-muscle is attached as it were to

a central pillar, i.e. winds round the centre of gravity, and this effects the greatest economy of the strain necessary for the support of the weight of the shell and the visceral hump.

We thus at last reach the typical Gastropod with its operculum, conical spiral shell, twisted visceral hump, and antero-dorsal branchial cavity, and it is this type which has spread over the shore and down into the shallow seas. A number of primitive Gastropods, however, have managed to survive amidst less favourable surroundings by adapting themselves to special circumstances. *Haliotis*, for example, has gone back to the old habitat on the underside of boulders, and this has been associated with a flattening of the shell, and considerable reduction of its spiral, broadening of the right shell-muscle and the foot, modification of the branchial shell-slit into a series of holes, and so on.

The *Fissurellidae* have also re-established themselves in a similar habitat, and in association with the clinging habit have re-acquired bilateral symmetry, especially as regards the shell-muscle and the well-known specializations of the branchial cavity and ctenidia.

Pleurotomaria has migrated into deep water, where perhaps many of the adaptations found in shallower water are also of value, though the environment is less favourable except as regards competition of other forms. Retraction also is of less importance.

In all these somewhat divergent types, and in the less known *Scissurella*, both ctenidia have been retained, but in *Haliotis*, *Scissurella*, and even *Pleurotomaria*, the left gill is larger than the right. Probably the environments of these forms are unfavourable to respiration, necessitating a maximum respiratory surface.

The *Docoglossa* have specialized in relation, first to a clinging, and then to an attached habit. In correlation with this, the paired shell-muscle has become a horse-shoe, well suited to pull down the shell so that its entire edge comes into contact with the subjacent rock-surface. At the same time the viscera have been compacted, and the shell has become a conical cap, with at most an apical trace of a median spiral.

It is possible that the *Bellerophonitidae* may have been early but twisted Gastropods with a median spiral, or they may have been pre-torsional forms. The great broadening of the shell-mouth in some of them suggests a clinging habit, with its need for a complete cover for the animal.

Probably before the branchial cavity shifted forwards the efficiency of its flushing arrangements was increased by the development of a sinus in the median posterior part of the shell and mantle, which deepened into a slit corresponding to the opening of the anus. This slit has shifted forwards with the mantle cavity, and undergone well-known modifications in *Haliotis* and the *Fissurellidae*. The slit persists both in *Pleurotomaria* and *Scissurella*.

In forms possessing but one ctenidium, the incurrent stream on the side of the lost ctenidium has of course disappeared, and by movement of the more or less median anus and excretory apertures to the right, they have

been more completely removed from the proximity of the left ctenidium and its incurrent stream. With this shift of apertures to the right, a lengthening of the rectum, &c., has evolved *pari passu*, so that the anus, &c., tend to move forwards on the right side. In this improved arrangement the slit is no longer necessary and—as it must have always been a weak point in the structure of the shell—has disappeared. It has also been lost in the Docoglossa, where a slit would undoubtedly militate against firm attachment, and its transfer in the Fissurellidae to the posterior part of the branchial cavity has not only minimised the reduction in the strength of the shell due to its presence, but also promoted efficient flushing in a special way. For it is just above the anus, so that the excurrent stream is as short as possible and does not take, as in *Haliotis*, &c., a direction contrary to the incurrent streams with resulting interference with the flow of both it and them. It may, however, be noted that in *Haliotis* a part of the excurrent stream makes its exit form each of the series of holes into which the slit is converted—just as it would do from the successive parts of a continuous slit—and the conversion of the slit into a number of holes also prevents the shell from being too much weakened.

In the foregoing article my aim has simply been to make a short preliminary statement of the results to which researches on the habits of Mollusca and the connected structural adaptations have led me.

I wish to gratefully acknowledge much kind help, and many valuable suggestions from my friend and colleague Dr. H. J. Fleure, who has been closely associated with me for some years in researches upon the structure and habits of Molluscs, especially of Gastropods, and in speculations on their phylogeny. Further articles, by one or both of us, will enter into a fuller discussion of the subject matter of this excursus, giving further details, and reviewing the relevant literature.

CURRENT LITERATURE.

Pilsbry, H. A.—Manual of Conchology, ser. ii, vol. xvii (pt. 68), pp. 209—232 xi-xviii, pls. 44—65. Philadelphia: Academy of Natural Sciences.

With the issue of part 68 Dr. Pilsbry completes another volume of this invaluable monograph, and commences the seventeenth volume which is to be devoted to the African *Achatinidae*.

In an interesting introduction he points out that these molluscs differ from the *Bulimulidae* by the long kidney, from the *Acavidae* by the diverse venation of the lung and the different dentition, and from the *Helicidae* chiefly by the narrow central tooth of the radula and the structure of the shell. So far no slug-like *Achatinidae* are known, but Dr. Pilsbry believes such to exist.

The African species are classified in three groups or sub-families, viz., *Achatininae*, *Stenogyrinae*, and *Coelioxinae*.

The first sub-family comprises about a dozen genera. With three exceptions all the forms conform closely to a common type. Very brief particulars are then given of the generative and other organs in the different genera, together with a key based on shell characters. Of the anatomy of the second sub-family but little is known.

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SUPPLEMENT TO THE REVISION OF THE NEW
ZEALAND POLYPLACOPHORA,
WITH DESCRIPTIONS OF NEW SPECIES. (*)

BY HENRY SUTER.

(Plate ix.)

Callochiton empleurus, Hutton, sp.

Pl. ix, figs. 1—4.

Shell small, elongated oval, subcarinated, slopes very slightly convex, flesh-colour, with a squarish white patch on the posterior part of the jugal tract. Anterior valve (fig. 1) almost smooth, but minutely punctate; anterior margin with square white spots at irregular distances, and faint traces of radiate riblets. Posterior margin with a median notch. Intermediate valves (fig. 2). Central area minutely punctate, the jugum mostly smooth, with a few transverse shallow furrows; the pleural tracts with 9—10 deep pits on each side in front of the anterior edge of the lateral areas; these short pits become shorter and shallower towards the median part of the valve. Lateral areas raised, distinct, with well pronounced concentric ridges. Posterior valve (fig. 3) rather indistinctly minutely punctate, with a subcentral mucro, posterior slope slightly concave. Girdle (fig. 4) with characteristic minute, elongated and imbricating glossy scales. Colour of valves fleshy, lighter and with white streaks on the jugum. A white squarish spot on each intermediate valve on the posterior part of the jugum, and on the tail valve in front of the mucro. Interior pink, with the sutural laminae white. Sinus rather broad, shallow. Intermediate valves with 3 slits on each side.

Length 22, breadth 9 millim; divergence 83°.

Hab. —Near Stewart Island in about 15 fath.

Type in the Colonial Museum, Wellington.

A specimen was found on oysters dredged near Stewart Island by Mr. C. Cooper, of Auckland, who most kindly presented it to me. This specimen, partly rolled up, was used for giving some further information on this apparently rare species. As I did not want to disarticulate the only specimen, the number of slits in the terminal valves still remain unknown. The habitat of this species was hitherto unknown.

(*) Vide : Proc. Malac. Soc. Lond., 1897, vol. ii, p. 183.

JOURN. OF MALAC., 1905, vol. xii, No. 4.

Isechnochiton (s. str.) **fulvus**, n. sp.

Pl. ix, figs. 5—10.

Shell (fig. 5) small, elongated oval, with the sides subparallel, obtusely angled, slopes flatly convex, fulvous. In size, outline and colour very much like *Lepidopleurus iniquatus*, Reeve. Anterior valve (fig. 6) with a few concentric ridges, minutely quincuncially punctate; the anterior margin white, the remainder uniformly fulvous. There is a slight posterior median notch. Intermediate valves (fig. 7). The whole surface minutely punctate like the anterior valve, with a few concentric ridges, which are more strongly developed on the lateral areas. The latter are distinctly separated from the central area by a broadly rounded edge, and there is no indication of radiate riblets. Posterior valve (figs. 8, 9) concentrically ridged and quincuncially punctate like the other valves; mucro subcentral, posterior slope slightly concave. Girdle (fig. 10) covered with very small imbricating scales of somewhat unequal size. Under the microscope they are seen to be flatly convex and deeply grooved, usually four grooves on a scale. The girdle is mostly concentrically banded with white and fulvous, two rows of scales to each band. Colour varies from light to dark fulvous, the dorsal and anterior areas being always lighter coloured. The anterior margin of the head valve, the anterior and lateral margins of the intermediate valves, and the entire margin of the tail valve have a narrow white border. Interior dirty white; sinus broad and deep, smooth. Anterior valve with 12 slits at unequal distances; intermediate valves with 1 slit on each side, posterior tooth small; posterior valve with 12 slits, the teeth unequal in breadth. All teeth are sharp and slightly grooved on the outer side.

Length 12, breadth 7 millim.; divergence 100°.

Hab.—Te Oneroa, Preservation Inlet and Brighton, Otago, South Island of New Zealand.

The only New Zealand *Chiton* which bears a close resemblance with this species is, as already pointed out, *L. iniquatus*, which however may at once be distinguished by the longitudinally striated intermediate valves. Dr. Torr informs me that this species also occurs in South Australian waters.

Plaxiphora glauca, Quoy and Gaimard, sp.

Chiton glaucus, Q. and G.: Voy. de l'Astrol., Zool., vol. iii, pag. 376.

Pl. lxxiv, figs. 7—11 (1835).

I have specimens, found alive, from the Chatham Islands, collected and kindly sent to me by Mr. Fougère. They agree perfectly with Tasmanian specimens. It seems rather curious that such a large shell should not have been recorded before.

***Plaxiphora* (s. str.) *murdochi*, n. sp.**

Pl. ix, fig. 11.

Shell rather small, oval, slightly narrowed behind, roundly angled along the top of the valves, blackish-green, finely sculptured, intermediate valves mucronated, girdle rather narrow, of a minutely scaly appearance and with sparse hairlets. Anterior valve radiately eight ribbed, with five diverging striae, which are coarser near the anterior margin, and from elongated nodules on the posterior edges. Intermediate valves with a lighter coloured posterior mucro, the whole surface sculptured with fine striae; the lateral areas are distinctly marked off by an elevated ridge descending from the jugum and dissolving into numerous fine striae near the margins, the striae on the lateral areas and the pleural tracts are arranged in such a way that they radiate from the ridge like the webs from the shaft of a feather. The posterior margin has a row of nodules on each side, like the anterior valve. Central area with diverging riblets in front of the mucro, but straight and parallel to the jugum on the remaining surface. Posterior valve small, very slightly emarginate behind; mucro terminal, slightly raised, from the elevated postero-lateral ribs the fine riblets diverge straight in front, obliquely on the posterior side. Girdle has, viewed with an ordinary pocket lens, the appearance of being minutely scaly, but a more powerful lens reveals the fact that the whole girdle is densely and regularly pitted. Near some of the sutures I found tufts of a few light coloured bristles, and a few hairlets were found near the margin of the girdle, but it was not easy to find them. It seems most likely that the whole girdle was originally densely covered with fine, short hairlets and tufts near all the sutures, but that they are very easily rubbed off. Colour blackish-green, girdle a little darker. The anterior valve has a few concentric zigzag bands of light blue; the intermediate valves have a number of wavy, longitudinal blue streaks, running over the lateral and pleural tracts; the posterior valve has only an indistinct blue patch on each side. Interior blue, the sutural laminae white. Sinus rather narrow, straight, the sutural laminae broadly arched, short. Anterior valve with 8 slits, corresponding to the external ribs, teeth strong, broadly grooved on the outside; intermediate valves with 1 slit on each side, corresponding with the ribs of the lateral areas; posterior valve with a smooth insertion plate with a posterior median sinus, no slits.

Length 17, breadth 13 millim.; divergence 108°.

Hab.—Near entrance to Kawhia Harbour, on rocks at half-tide. Much exposed to very heavy seas. (R. Murdoch).

Type in my collection.

With regard to the sculpture this species stands nearest to *P. biamosa* and *caelata*, but in both of these it is much coarser. The beautiful fine sculpture, colour, and the curiously pitted girdle, when devoid of hairs, separate it at once from the two.

I have great pleasure in associating with this species the name of its discoverer, Mr. R. Murdoch, of Wanganui, who also kindly supplied the drawing of the shell.

***Acanthochites (Loboplax) rubiginosus*, Hutton, sp.**

Pl. ix, figs. 12—17.

Toniria rubiginosa, Hutton : Trans. N. Zeal. Inst., 1872, vol. iv, p. 180.

(*Chiton rubiginosus*, Swains., in coll.)

Chiton rubiginosus, Hutton : Journ. de Conch., 1878, vol. xxxvi, p. 39.

Toniria rubiginosa, Hutton : Man. N. Zeal. Moll., 1880, p. 114.

„ „ Pilsbry : Man. Conch. (1), 1893, vol. xv, p. 107.

Acanthochites (Loboplax) costatus, Suter : Proc. Malac. Soc. Lond., 1897, vol. ii, p. 194, non Adams and Angas.

Acanthochites rubiginosus, Hutton : Index Faunae Novae Zealandiae, 1904, p. 86.

Shell (fig. 12) oblong, small, subcarinate, the whole surface granular, mostly yellowish-pink, girdle with minute spines and sutural tufts. Anterior valve (fig. 13) with five ribs which are not very conspicuous, the whole surface granulated, the granules being largest, and sometimes unequal in shape, near the margin, and decreasing in size towards the apex of the valve, which is slightly sinuated. Intermediate valves (fig. 14) with the jugum sparsely longitudinally substriated; the pleural tracts are granular; the lateral areas, but slightly raised and not very clearly separated from the pleural tracts, are similarly sculptured, the granules being again largest near the margin, round or oval in shape. The valves are subcarinate, beaked posteriorly. Posterior valve (figs. 15, 16) small, the mucro central, with a smooth triangular area in front, beyond which the whole surface is granular, the granules being comparatively large. Posterior slope concave, no signs of radiating ribs. Girdle (fig. 17) thick, fleshy, beset with microscopic white spicules; there are sutural tufts of white spicules, 7 on each side, and 4 tufts in front of the head valve. Colour.—This is, as I pointed out in my former paper, variable, adult specimens showing mostly a pinkish colour, yellowish on the back, but young shells sometimes have a most beautiful colour arrangement, the granules being white, pink, light brown and light blue. The jugal tract is in the intermediate and tail valves of a darker colour, mostly reddish-brown and assuming a triangular shape. The girdle is light fulvous with small patches and radiate bands of whitish-yellow. Interior white, but the centre of the valves, head valve excepted, is pink coloured; the sinus is rather narrow and deep. The anterior valve with 5 slits, corresponding with the ribs; intermediate valves with 1 slit on each side, strong teeth, and a stout valve-callous; posterior valve with a low, thick insertion plate and 4 short slits.

The figured specimen has : Length 17, breadth 13 millim.; divergence 103°.

Hab.—Cook Straits, Foveaux Straits, in the latter locality in about 15 fath.

Type in the Colonial Museum, Wellington.

At the end of 1898 Dr. Pilsbry very kindly brought the fact under my notice that my *A. costatus* was not the same as the Australian shell, and that it had to be called *A. rubiginosus*, Hutton. Being unable to procure a specimen of *A. costatus*, Mr. Etheridge, jun., Curator of the Australian Museum, Sydney, informing me that only two specimens had ever been found, and that it was unknown to Australian collectors, I now proceed to point out the difference of the two species from Smith's diagnosis in *Mar. Conch.*—: *A. costatus* is more elongated and narrower than *A. rubiginosus*, the respective ratios being 1 : 2, 6 and 1 : 1, 3. *A. costatus* has the lateral areas well defined by a raised keel, which is absent in *rubiginosus*. The posterior valve of *costatus* has six radiating ridges and the insertion plate with 6 notches, against no ridges and 4 slits in *rubiginosa*. The colour of *costatus* is pale brown, whilst *rubiginosus* is sometimes beautifully coloured, producing quite a kaleidoscopic aspect, as Dr. Torr correctly expressed himself when I lately showed him some specimens in my collection.

Chiton quoyi, Desh., n. sub-sp. *Ilmosa*.

Chiton aereus, Suter: *Proc. Malac. Soc. Lond.*, 1897, vol. ii, p. 195,
non Reeve.

When I wrote the Revision of the New Zealand Polyplacophora in 1897 I had not seen the true *C. aereus*, Reeve, which seems to be a very rare species. I sent a specimen of my supposed *aereus* to Dr. Pilsbry in 1898, and he told me that it was only a slight form of *C. quoyi*, not specifically distinct, and not the true *aereus*. I also sent specimens to Mr. E. R. Sykes, of London, asking him to kindly compare it with the type specimen in the British Museum. With his usual obliging readiness he sent me the following information: "If the specimen, presumably type, in the Brit. Mus. can be trusted, your Chitons are not, I think, *aereus*: the sculpture on that species is *much* stronger and coarser on the median areas, i.e. more like that of *canaliculatus*. The Museum *aereus* is larger—nearly twice the size—and of an olivaceous green." A few years later I received some specimens of a *Chiton* from Mr. Murdoch, Wanganui, which he had found near Cape Egmont, and these proved to be the true *C. aereus*, Reeve. It is indeed very different from my supposed *aereus*, which I now class as a sub-species of *C. quoyi*, Desh. It differs from the species in being smaller and narrower, the jugum angled, not carinated, not always smooth, colour yellowish to green, mostly coated with blackish-green. Anterior valve with 8, posterior valve with 15 slits, divergence about 100°, against 120° in the species.

Length 20, breadth 12 millim.

Hab.—Under stones on mud-flats in Manukan and Auckland Harbours.

Type in my collection.

Chiton aereus, Reeve.

This species belongs to what I will call the *canaliculatus* group, having a coarse sculpture and the central area with strong longitudinal ribs and grooves. Also *C. stangai*, Reeve and *C. limans*, Sykes, are to be included in this group. *C. aereus* may at once be separated from the others by the longitudinal furrows of the pleural tracts being rubbed off in the middle, not unlike those in *Callochiton empleurus*, where however they are much shorter.

In my specimens the surface of the valves is microscopically shagreened, the girdle has mostly a few radiate white bands on the sides, and the scales are faintly striate. There occurs a red variety, sometimes yellowish-red, as in a specimen found by Miss Mestayer at Lyall Bay, or bright cinnabar red, as in a specimen I found in Hauraki Gulf. This latter specimen is also banded with white on the girdle, and the lateral areas of valves 3—5 are clouded with light black.

Hab.—Cape Egmont, west coast of North Island (R. Murdoch); Lyall Bay (Miss Mestayer); Hauraki Gulf (H. S.).

Chiton huttoni, Suter.

This species will be described and figured in Trans. N. Zeal. Inst., vol. xxxviii, to be published in 1906. This species also belongs to the *canaliculatus* group, its usual colour is yellowish-olive, but a brick-red variety is also met with.

Acanthopleura (Maugeria) granulata, Gmelin, sp.

Chiton granulatus, Gmelin: Syst. Nat., 1790, vol. iii, pl. 16, p. 3205.

Acanthopleura (Maugeria) granulata, Pilsbry: Man. Conch. (1), 1893, vol. xiv, p. 227, pl. lx.

„ „ *corticata*, Suter: Proc. Malac. Soc. Lond., 1897, vol. ii, p. 198, figs. 12—17 in text.

At the request of Dr. Pilsbry I sent him the valves and denuded girdle of *A. corticata*, Hutton, for examination, and I was greatly astonished on receiving from him the following information:—“*A. corticata*, Hutton, is merely a specimen of *A. granulatus*, Gmelin, of the West Indies. That species varies a good deal, and we have valves exactly like yours. By using the key on page 217 of Manual you would have brought your specimen to that species.” That is quite true, but even if I had found it to be *A. granulata* I would certainly have doubted the correctness of my identification, for who would look for a West Indian Chiton in New Zealand? However, Dr. Pilsbry is right. There is now a fine, perfect specimen in the Colonial Museum, Wellington, which perfectly corresponds with specimens from the West Indies kindly presented to me by Dr. Pilsbry.

Another mollusc we share with the West Indies is *Pecten medius*, Lamk., of which our *P. laticostatus*, according to Hedley, is a synonym.



1.



5.



6.



2.



7.



3.



11.



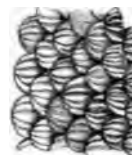
8.



4.



13.



10.



9.



14.



16.



12.



15.



17.

H. S. del ad nat. Fig 11, R.M. del ad nat

Huth, Lith^r London

NEW SPECIES OF POLYPLACOPHORA.

***Onithochiton semisculptus*, Pilsbry.**

Man. Conch., (1) 1893, vol. xiv, p. 247, pl. lv, figs. 10—11.

Some years back Mr. H. B. Kirk (now professor of biology) after his return from the Chatham Islands showed me two Chitons belonging to the genus *Onithochiton*, and I was sure I had not seen the species before. Mr. Kirk very kindly presented them to me, and I found that they represented the above species, whose habitat was unknown to Dr. Pilsbry. I sent him one specimen for comparison with the type, and I was kindly informed that my determination was correct.

One specimen is now in the Canterbury Museum, Christchurch, the other in my collection.

EXPLANATION OF PLATE IX.

- | | | |
|--------------|--|---------------------------------|
| Figs. 1—3. | <i>Callochiton empleurus</i> , Hutton. | Valves enlarged. |
| Fig. 4. | " " " | Girdle scales. $\times 60$, |
| " 5. | <i>Ischnochiton fulvus</i> , Suter. | Shell nat. size. |
| Figs. 6—9. | " " " | Valves enlarged. |
| Fig. 10. | " " " | Girdle scales, $\times 60$. |
| " 11. | <i>Plaxiphora murdochi</i> , Suter. | Shell enlarged. R. Murdoch del. |
| " 12. | <i>Acanthochites rubiginosus</i> , Hutton. | Shell nat. size. |
| Figs. 13—16. | " " " | Valves enlarged. |
| Fig. 17. | " " " | Part of girdle, magnified. |

A FEW NOTES FROM THE ANTIPODES.

By HENRY SUTER.

(1.) It is not very long since I acquired Bruno Beutler's "Die Anatomie von *Paryphanta hochstetteri*, Pfr.," shortly reviewed in this Journal (vol. viii, 1901, p. 125). Though over five years have passed since its publication, yet I beg to be allowed to make a few remarks which may prove of general interest.

The author mentions that Prof. Spengel helped him considerably to procure the necessary literature, but on examining the long list, four pages, we find that no mention is made of Lieut.-Colonel Godwin-Austen's paper on the anatomy of *Paryphanta hochstetteri* (Proc. Mal. Soc., vol. i, page 5), though it was published as far back as 1893, whilst Beutler's paper was issued the 24 April, 1901! Such an omission is hardly excusable; does the University of Giessen not keep the "Zoological Record"? There is also no mention made of Mr. Walter E. Collinge's paper "On the Anatomy of certain Agnathous Pulmonate Mollusks" (Ann. Mag. Nat. Hist. (7), vol. viii.) which appeared in January, 1901, nor of my short papers published in 1899. Like Godwin-Austen, Beutler seems to have overlooked the interesting fact, demonstrated by Collinge, that the vas deferens, joining the penis very low down, continues, hidden by tissue, to the distal end. However, there arises the question whether this peculiarity is a constant feature, as Beutler gives a figure of a cross-section of the penis (fig. 49) which does not show the vas deferens, but it is not stated from which part this section was obtained.

The formula of the teeth of the odontophore was found by Godwin-Austen to be 67—1—67, by Beutler 59—1—59. the difference being perhaps due to different ages of the animals examined. The high papillae on the interior wall of the penis, recorded by Beutler, seem to have escaped Godwin-Austen's notice.

The specimens examined by Beutler belonged to the dark brown variety of *P. hochstetteri*, as it occurs in the Takaka Valley and in the Manawatu district, and it seems to have been overlooked by many systematists that he bestowed the name *obscura* on this variety.

(2) When dealing with "Clessin's new Species of *Scalaria* from New Zealand" in this Journal, 1899 (vol. vii, pag. 54), I stated that *S. zelevori* was first described by Frauenfeld in "Reise der Novara, Zool., 1868." This however is not correct, as I found out lately after the acquisition of a reprint of "Bericht über die von der Novara—Expedition mitgebrachten Mollusken, von Dr. Dunker and Joh. Zelevor," which appeared in "Verhandl. Zool. Bot. Gesell. Wien, 1866, vol. xvi" There, on page 912, is to be found the diagnosis of *Scalaria zelevori*, Dunker. The latter is therefore the real author of the species, and the date of publication 1866. Why Frauenfeld put *his* name after the species in the Novara work I cannot tell.

(3) The generic position of some of the New Zealand species of the family *Pleurotomidae*, as suggested by myself, has never appeared to me to be quite satisfactory, but the want of literature did not allow me to attempt a better classification. Mislead by remarks in "Harris' Cat. Tert. Moll. Australasia" on *Pleurotoma wanganuiensis* and *P. burchanani*, Hutton, I classed about half a dozen species under *Surcula*. Fortunately the splendid "Essais de Paléoconchologie Comparée par M. Cossmann" are now in my possession, thanks to the great liberality of the author, and lately I have made an attempt to classify the species represented in my collection (marked with an asterisk in the list). Being of general interest, I venture to publish here a synopsis.

FAM. PLEUROTOMIDAE.

SUBF. PLEUROTOMINAE.

Pleurotoma ischna, Watson, 1881.

* *Drillia novae-zelandiae*, Reeve, 1843.

* " *trailli*, Hutton, 1873.

* " *buchanani*, Hutt., subsp. *maorum* E. A. Smith, 1877.

" *amoena*, E. A. Smith, 1884.

* " *verrucosa*, Suter, 1900.

* " (*Crassispira*) *laevis*, Hutton, 1873.

* " (*Cymatosyrinx*) *lyallensis*, Murdoch, 1905.

Spirotropis bulbacea, Watson, 1881.

SUBF. CLAVATULINAE.

Surcula gypsata, Watson, 1881.

SUBF. BORSONINAE.

* *Mitromorpha subabnormis*, Suter, 1900.

* " *substirata*, Suter, 1900.

* " *suteri*, Murdoch, 1905.

* *Bathytoma albula*, Hutton, 1873.

* " *zealandica*, E. A. Smith, 1877 (= *cheesemani*, Hutton, 1878).

SUBF. MANGILIINAE.

Mangilia ula, Watson, 1881.

* " *sinclairi*, E. A. Smith, 1884.

" *goodingi*, E. A. Smith, 1884.

* " *dictyota*, Hutton, 1885.

* *Mangilia subanstitialis*, Suter, 1900.

* " *flexicostata*, Suter, 1900.

* " (*Clathurella*) *nodicincta*, Suter, 1900.

* " " *epentroma*, Murdoch, 1905.

" " " subsp. *whangaroensis*, Murdoch, 1905.

* *Daphnella cancellata*, Hutton (= *lymnirforensis*, Hutton, non Kiener).

" *membranacea*, Watson, 1886.

" *xanthias*, Watson, 1886.

" *protensa*, Hutton, 1885.

ON THE HABITAT AND FOOD OF *HELIX* *DESERTORUM*.

BY THE REV. A. H. COOKE, M.A.,
HEAD MASTER OF ALDENHAM SCHOOL.

Two recent visits to Egypt, in the winter of 1903 and 1904, enabled me to examine carefully the conditions under which this species lives, and which suggested certain interesting problems

Helix desertorum is abundant in the neighbourhood of the Pyramids of Ghizeh. It does not appear to inhabit the cultivated district at all. The ground on which the Pyramids stand is sheer desert, loose sand, stones, and bare rock. At first sight, not a single living plant appears, but careful search will reveal, here and there, a few dry stubby wisps. Near to them, a few *desertorum* may be found, but the great mass of living specimens are at least 500 or 600 yards away, on a plateau which appears utterly destitute of vegetable life. Here the species abounds; the young live gregarious under stones, which shield them from the burning rays of the sun, while the adults occur, for the most part, singly in the open, some attached to rock, the majority scattered about on the open face of the smooth sand. I may remark parenthetically that, at the time of my visits, which were in the months when rain occasionally falls, the food conditions were presumably at their optimum, and not an atom of food was to be seen. There was no appearance of "aestivation" or "hibernation": the adults were as fat as butter, and evidently in prime condition.

The problem naturally suggested itself, What do the creatures feed on? Cannibalistic tendencies are out of the question, for the radula is of the normal type represented by *H. aspersa*. It occurred to me that an examination of the excreta might supply some answer to the question, and accordingly I collected a number of specimens, carefully brushing away all traces of sand from the region of the mouth, and, on returning home, handed a selection from their excreta to my senior science-master, Mr. J. M. Wadmore, M.A., F.C.S., for analysis. He reports as follows:—

"I have much pleasure in giving you the result of my examination of the Egyptian snails' excreta.

"Broadly speaking, the material consisted of two portions. (1) Sand, forming about half the total weight; (2) a fluffy, fibrous substance. The latter was extracted with warm dilute hydrochloric acid, in which a small portion dissolved, but the greater part remained unaffected.

"The solution thus obtained was coloured with organic matter, the nature of which I was unable to ascertain. I succeeded, however, in establishing the presence of iron and calcium, both in relatively considerable quantity. Potassium I was unable to detect, even by means of the spectro-scope, and though I should not like to say definitely that this metal is absent, I feel sure, at any rate, that the amount must be excessively small.

"In the portion undissolved by the acid, I found unmistakable indica-

tions of carbon, in considerable quantity ; also nitrogen, though in smaller amount, and, in all probability, hydrogen. Doubtless these elements were originally united to form complex organic substance.

"Conjectures as to the sources from which the snails obtained these elements must necessarily be vague and uncertain ; from some sort of plant, I should fancy . The presence of carbon and hydrogen, also the traces of the metals iron and calcium, all point to this ; but it must be of unusual nature, otherwise potassium ought to occur in recognisable quantity."

It is natural to conjecture that the snail feeds on some minute form of lichen, which it rasps off the surface of the stones . No lichen, however, is visible, and one would naturally expect, even if so low a form of vegetable life as lichen were the staple of food, to find considerable traces of potassium. In reference to this, Mr. A. W. Hill, Lecturer in Botany at the University of Cambridge, writes to me : "There is no doubt that small lichens contain potassium salts like all other plants. But I am not sure whether any direct analysis has been made. I have talked to our physiological botanists, and they agree with the above remarks."

My friend, Mr C. T. Heycock, F.R.S., suggests the possibility that some small alga like *Nostoc* may be the food. "*Nostoc* seems to be present in very arid places ; it is invisible by day, but swells into a jelly-like mass when moist, say, with morning dew."

I am inclined to think that the true solution of the problem lies in the direction suggested by Mr. Heycock. Whether any chemical analysis has as yet been made of this class of alga I am unable to say, but if such analysis were to show that potassium did not occur, or occurred only in excessively small quantities, in this alga, some advance would have been made. One or two points at least are clear. The snail obviously swallows sand in large quantities. Some of the grains evacuated approach a millimetre in length and breadth. Its food, therefore, would seem to occur, not on the rocks or stones, but amongst the sand itself, and this will account for the fact that so many specimens are found on the sand. Evidently, too, the food must be of a nature so minute as to make it impossible to swallow it without swallowing the sand at the same time. Thus the method of nutrition in *Helix desertorum* will appear to be somewhat analogous to that of the ordinary bivalve mollusc, which nourishes itself on the minute organisms present in the water which passes through its system.

I may add that I have sent a good series of *H. desertorum* to the British Museum, and also suggested to Mr. E. A. Smith that he might like to try over again the well-known experiment on the creature's vitality. He kindly consented, and I sent him half-a-dozen good living specimens, which have, under his care, started in an attempt to "beat the record" of the celebrated snail of 1850, which was discovered to be alive after it had been fixed to a tablet for four years (Ann. Mag. Nat. Hist., 1850 (s. 2), vol. vi, p. 68.)

ON THE ANATOMY OF ENSIS (SOLENI) MAGNUS, SCHUMACHER.

By H. H. BLOOMER.

By the kindness of Dr. Jensen of the Copenhagen Museum I have been enabled to examine a specimen of *E. magnus*.

Ensis magnus is an elongated animal, measuring in length about six times the measurement from the dorsal to the ventral surface at its deepest part. It is larger and more massively built than *E. ensis*. It curves a little dorsally (not quite so much as *E. ensis*), is bilaterally symmetrical, and is enclosed ventrally by the concrescence of the edges of the mantle lobes, with the exception of the apertures at the anterior and posterior ends, and a fourth aperture situated nearly at the centre of the ventral surface (the aperture is nearer the posterior than the anterior end, while in *E. ensis* it lies nearer the posterior end).

The periostracum passes from the outside of the shell to the edges of the mantle lobes, to which it adheres.

The pallial muscles form a deep band along the margin of the mantle lobes, and, at the anterior end, encircle the pedal aperture through which the foot is protruded. At the posterior end the muscles assume a more elliptical condition, being more coalesced both dorsally and ventrally, and form the siphon containing the afferent and efferent chambers. The ventral portion of the proximal portion of the siphon extends more posteriorly than in *E. ensis*.

The foot projects from nearly the centre of the ventral surface of the animal, and proceeds in an anterior direction. A little anterior to the foot is the mouth, and in front of the mouth, is the very broad anterior adductor muscle. On each side of the viscero-pedal mass are the labial palps, commencing between, and passing posteriorly to them, are the two gills, which continue as far as the siphon. The inner sides of the bases of the gills are joined together from the foot for about half their distance, whereas in *E. ensis* they are not so connected.

The anus opens from the free portion of the rectum, into the cloacal chamber behind the posterior adductor muscle.

The siphon consists of two separate chambers, the upper one the exhalant, and the lower one the inhalant. The free portions of the siphonal chambers are very short and separate from each other. Both are encircled with a fringe of tentacles (the tentacles are not so long as in *E. ensis*).

The fourth aperture is an elliptical opening which narrows very much

on the inside edge of the mantle lobes. Around the inside of it, but near the outer edge, is a row of tentacles; those on one side alternating with those on the opposite side (the tentacles are not so long as in *E. ensis*.)

On the inside of each mantle lobe is a groove passing dorsally from this aperture towards the foot, and in it lie the distal portions of the labial palps.

The anterior adductor muscle is an extremely broad and shallow muscle, deepening as it proceeds posteriorly. It is connected anteriorly with the mantle lobes and dorsal integument, and posteriorly with the dorsal and ventral integuments.

The posterior adductor muscle is a comparatively small muscle, curved ventrally and flattened dorsally. It is joined anteriorly with the bifurcations of the retractor pedis posterior muscle, and posteriorly with the dorsal integument.

The retractor pedis anterior muscles, as in *E. ensis*, have long bifurcations, the posterior ones passing through the liver to the valves of the shell, and the anterior ones going some distance over the anterior adductor muscle before adhering to the shell.

The retractor pedis posterior muscle is a thick muscle of medium length, the bifurcations of it, which are attached to the shell, rest against and are connected with the posterior adductor muscle.

Owing to the imperfect preservation of the inside of the animal it is not possible to make out the internal structure in detail, but it appeared to be very similar to *E. ensis*.

The gills are of the type heterorhabdic and are also plicate, but the plication is shallower than in *E. ensis*, while the interlamellar junctions are longer. The number of filaments in a plica range between 13—17.

ON THE ANATOMY OF CERTAIN SPECIES OF SOLENIIDÆ.

By H. H. BLOOMER.

(Plate x.)

I am indebted to the late Professor E. von Martens of the Berlin Museum, for the privilege of examining the specimens now described which he so kindly placed at my disposal. When sending them he gave the following particulars:—

- “2. *Solecurtus dombeyi*, Lam. Peru, from Professor Dunker's collection.
2. *Solen corneus*, Lam. Indian sea, from the collection of Lamare Piegnot made about 1836.
 1. *Solen gouldi*, Conr. Yeddo = Tokio, Japan, collected by Professor Hilgendorf in 1873—76.
 2. *Cultellus javanicus*, Lam. Singapore, collected by myself in 1860—62.
 2. *Solen delerscoti*, Chemn. (= *brevissimus*, Marts., 1865), Singapore, collected by myself at the same time.
 1. *Solen (Solena) rudis*, C. B. Adams, Panama, very near to *S. ambiguus*, Lam. from the West Indies.”

***Solecurtus dombeyi*, Lam.**

Pl. x, figs. 1—3.

External characters.—The animal curves outwardly along the dorsal surface. The length from the anterior side of the anterior adductor muscle to the posterior side of the posterior adductor muscle is 51 millim. and the depth 19.

The mantle lobes are joined together at the anterior side of the anterior adductor muscle. Then, separately, they pass with a curve around the anterior end, and proceed posteriorly until they reach a position a little anterior to the proximal portion of the siphon, where they become constricted, consequently, the pedal aperture occupies the anterior and nearly the whole of the ventral surface. Laterally, and some distance anteriorly to the posterior edge, the mantle lobes are connected on their inner sides with the proximal portion of the siphon, which enables them to contain the free portions of the siphon when contracted, and the greater portion of them when extended (fig. 1. *P.L.P.*)

In the specimens examined the free portions of the siphon are nearly enclosed, the exhalent (fig. 1. *Ex. S.*) portion being contracted, and folded on itself, and the inhalent one (fig. 1. *In. S.*) partly inverted, so that the

whole of it is withdrawn into the pallia chamber. The proximal portion of the siphon is short, but of greater depth than that of *Taapelus rufus*, while the free portions, though long and muscular, are shorter and thicker than those of the same species. Internally they show both longitudinal and fine transverse ribbing, but externally only the transverse ribbing.

There are large siphonal retractor muscles. The foot (fig. 1, *F.*) is massive and of medium length, being longer and of a more uniform depth than in *T. rufus*.

The gills reach to the proximal portion of the siphon. The inner sides of their bases are joined together, and divide the exhalent from the inhalent chamber. The teeth of the shell are buried in the viscera about the centre of the dorsal surface.

Musculature.—The musculus cruciformis (fig. 1, *M.C.*) is present at the extreme ventral edge of the siphon, but it is not so pronounced as in *T. rufus*.

i. *Pallial muscles.*—The muscles of the pallial edge commence at the anterior adductor muscle as a deep band, and gradually decrease in depth as they proceed posteriorly. The muscles of the siphon are strongly developed, and the siphonal retractor muscles, where they adhere to the valves of the shell, present a large surface.

The anterior adductor muscle (fig. 1, *A.A.*) is a broad, comparatively long, but shallow muscle, flattened dorsally, and curved ventrally. As in *T. rufus* it is divided by the ventral integument passing through it. The muscle is connected anteriorly with the mantle lobes, and posteriorly with the dorsal and ventral integuments.

The posterior adductor muscle (fig. 1, *P.A.*) is more oval in shape than that of *T. rufus*, and is joined anteriorly by connective tissue with the bifurcations of the pedis retractor posterior muscle and dorsal integument, and posteriorly with the dorsal integument, the siphon, and the mantle lobes.

Just below the siphon there are two transverse muscular bands—the musculus cruciformis of Von Ihering (fig. 1, *M.C.*), which quickly converge and unite at the centre, the four distal ends after passing through the mantle lobes, are attached to the valves of the shell, thereby resembling the same muscle found in *Solercurtus strigillatus*, but more particularly that in *T. rufus*, though on a very much smaller scale than the former, and in not having the posterior portion shortened as in the latter.

ii. *Pedal Muscles.*—The muscles of the foot are strongly developed, and structurally approximate nearer to those of *Pharella (Cultellus) orientalis* than those of *T. rufus*.

The pedis retractor anterior muscles run ventrally inside the longitudinal muscles (that is, they are exposed when viewed from the pedal cavity). The free portions are thick and short, and pass dorsally to the shell. There are no bifurcations.

The pedis retractor posterior muscle (fig. 1, *P.R.P.*) is also short and thick. The bifurcations are short too, and rest on the antero-dorsal surface of the posterior adductor, where they are connected with the valves of the shell.

There appears to be some indication of the presence of the branchial retractor muscles as noticed in *S. strigillatus*, but in the specimens examined they are so indistinct that it is impossible to state definitely whether they exist or not.

Alimentary Canal.—The lips (figs. 2 and 3, *A.L.* and *P.L.*) are broad and not very long. The oesophagus (figs 2 and 3, *Oe.*) is short and soon opens into the oesophageal division of the stomach (figs. 2 and 3, *Oe. St.*). The latter is large and of irregular shape. Posteriorly it is separated from the cardiac (fig. 2, *C. St.*) and central (fig. 2, *C.D.*) divisions by a slight muscular ridge. On examining the left side of the stomach (fig. 2) it will be observed that the cardiac division, which is small, lies between the oesophageal and pyloric (figs. 2, *P.St.*) divisions, and antero-dorsally to the central division. Further the central division is bordered dorsally by a more muscular ridge (fig. 2, *M.P.*), the homologue of the muscular papilla of *Solen.* On the right side of the stomach (fig. 3) the demarcation of the cardiac division is incomplete. The pyloric division (figs. 2 and 3, *P. St.*) is large, and posteriorly proceeds as the caecum of the crystalline style (figs. 2 and 3, *C.C.*) The latter is also large, and, gradually curving, traverses anteriorly some distance along the pedal cavity.

The intestine (fig. 3, *In.*), as in *S. strigillatus* and *T. rufus*, appears as a groove on the right anterior side of the caecum of the crystalline style, but as far as can be made out, the projection of the muscular layer between the two cavities is greater, and consequently reducing the channel of communication. At the distal end of the caecum the intestine becomes distinct and returns a part of the way along the dorsal surface. Leaving the caecum, it pursues a loose folded course to the dorsal surface of the pyloric division, then, turning posteriorly, continues as the rectum (fig. 1, *R.*) over the posterior adductor muscle to the exhalent siphonal chamber.

The liver (fig. 1, *L.*) lies laterally and ventrally to the stomach, but by far the greater part is underneath it.

Nervous system.—The nervous system seems to closely resemble that of *S. strigillatus*.

The Gills.—As in the species of *Solecurtus* examined by Dr. Ridewood, the lamellae are highly plicate, resembling more particularly those of *Solenocurtus (Tagelus) rufus*, in the interlamellar septa rising high up the demibranch, and in possessing a blood vessel at the apex of the plica. The number of filaments in a plica are, however, less. It is not possible to make out the structure in further detail as the gills are not well preserved.

Solen corneus, Lam.

Pl. x, fig. 4.

When compared with *S. vagina* shows the following differences:—The animal is not so muscular. The ventral part of the mantle lobes at the anterior end projects more anteriorly than the dorsal part (fig. 4, *M.L.*), whereas, in *S. vagina* they are not as angular. The anterior adductor muscle is proportionately not so wide, the distal portion of the foot is still shorter, and the posterior adductor muscle is much narrower, while the part of the animal posterior to the posterior adductor muscle is considerably longer. The internal structure apparently is the same.

Solen gouldi, Contr.

Pl. x, fig. 5.

Only one specimen of the above in the collection, which unfortunately had been pressed out of shape, and is in a very bad state of preservation.

It appears to be very similar to *S. vagina*, only differing from it in the anterior projection of the ventral portion of the anterior part of the mantle lobes (fig. 5, *M. L.*), more so than in *S. corneus*, Lam.

Cultellus javanicus, Lam.

Pl. x, fig. 6.

There are two specimens of the above in the collection, but, owing to their imperfect preservation, it is impossible to make out with any degree of certainty a great deal of the internal structure, particularly the alimentary canal.

The animal is slightly curved outwardly along the dorsal surface, and inwardly along the ventral surface, the centre of the latter being a little compressed. The anterior and posterior parts are tapered, and the ends rounded.

The mantle lobes are constricted along the whole of their ventral surface, so that the pedal aperture is confined altogether to the anterior end, and there is no fourth aperture. The muscles of the pallial edge form only a shallow band, and are not strongly developed. At the posterior end is the siphon, which likewise is not very muscular. In its proximal part the exhalent (fig. 6, *Ex. S.*) is separated from the inhalent chamber (fig. 6, *In. S.*) by a muscular wall, having its anterior side joined to the gills. The free portions of the siphon are very short, and encircled by a tentacular fringe.

The foot (fig. 6, *F.*), which at the distal end is axe-shaped, is long and of a nearly uniform depth.

The inside edges of the bases of the gills are joined together, while the outside edges have become disconnected with the pallial wall, as so frequently happens in the case of *S. vagina*.

One of the chief characteristics is the proportionately greater length of the posterior part of the animal.

The anterior adductor muscle (fig. 6, *A.A.*) is a somewhat oval shaped muscle, flattened dorsally, connected anteriorly with the mantle lobes, and posteriorly with the dorsal integument, and by connective tissue with the proximal portion of the foot.

The posterior adductor muscle (fig. 6, *P.A.*) is a comparatively wide and shallow muscle, connected anteriorly with the dorsal integument and the pedis posterior retractor muscle, and posteriorly with the dorsal integument and the siphon.

The retractor pedis anterior muscle, which is connected with the shell, is very short and not bifurcated, while the retractor pedis posterior muscle (fig. 6, *P.A.*) is very long, with long bifurcations, which are joined to the posterior adductor muscle and the valves of the shell.

As far as can be made out the alimentary canal has the appearance of consisting of a short oesophagus, large stomach with the usual divisions, and the caecum of the crystalline style and the first portion of the intestine either possessing separate passages with the outside of the organs joined together, or communicating with each other as in *S. striatellatus* and *dombeyi*.

***Solen delerscoti*, Chemn.**

S. delerscoti is very short, the length being not more than three and a half times the depth, and, judging from the specimens examined, a much smaller animal than *S. vagina*—though it has the appearance of being comparatively largely built, with a large foot and siphon. It very closely resembles *S. vagina*, differing from it in the shortness of the anterior part, particularly the anterior adductor muscle, and the greater length of the posterior part, more especially the proximal portion of the siphon. The specimens are not in a good state of preservation, but as far as can be seen of the alimentary canal, the only noticeable point is that the caecum of the crystalline style does not extend as far anteriorly along the pedal cavity.

***Solen (Solena) rudis*, C. B. Adams.**

Pl. x, figs. 7—9.

External characters.—The specimen was removed from the shell before being sent to me. The animal measures 7 c.m. from the anterior end of the mantle lobes to the posterior end of the posterior adductor muscle, and 21 millim. from the dorsal to the ventral surface. It is nearly of a uniform depth.

The mantle lobes are constricted along their ventral surface. The pedal aperture is situated at the anterior end and does not extend posteriorly, either dorsally or ventrally. The periostracum is only attached to the mantle lobes bordering the pedal aperture. Inside the lobes are two muscular flaps, which close the pedal aperture when necessary. There is no fourth aperture.

At the posterior end the mantle lobes form the proximal portion of the

siphon (fig. 7, *In. S* & *Ex. S.*). The latter is of considerable length and very muscular. Nearly the whole of the free portion is missing, so it is not possible to form any idea as to its length, or to say, if the exhalent portion is separate from the inhalent one as in *S. strigillatus* (fig. 7, *Ex. S.* and *In. S.*).

The labial palps are relatively short and wide. The gills pass posteriorly from the labial palps to the posterior end of the proximal portion of the siphon, and, on the outside of them, the bases are connected with the lateral siphonal ridges (fig. 7, *S.R.*), while on the inside they are joined together as in *S. strigillatus*.

A strong muscular dorsal integument is present resembling that of *Solen* and *Ensis*.

The kidneys extend slightly laterally along the mantle lobes as in *S. strigillatus*.

The foot (fig. 1, *F.*) is long and of nearly uniform depth. It, however, gradually increases in width towards the distal end, near which it is almost round, but suddenly tapers off at the extremity.

i. Pallial muscles.—The muscles of the mantle lobes form a deep band of muscles lying at right angles to the pallial edge, and are further strengthened by a band of longitudinal muscles along the concresced ventral part. The proximal portion of the siphon (fig. 7, *Ex. S.* and *In. S.*) is long, the arrangement of the muscles being similar to that of *S. strigillatus*, viz., large longitudinal muscles, covered internally by a muscular lining, and externally by the muscular integument.

Anteriorly the longitudinal muscles converge to form the siphonal retractor muscles, but they do not present nearly so large a surface where they adhere to the shell as in *S. strigillatus*. Between the proximal portion of the siphon and that representing the free portion are two muscular flaps or valves. This applies to the exhalent as well as to the inhalent chamber.

The anterior adductor muscle (fig. 7, *A.A.*) is a broad and deep muscle, flattened dorsally, and curved ventrally. It is joined anteriorly with the dorsal integument and mantle lobes, and posteriorly with the ventral integument. The posterior adductor muscle (fig. 7, *P.A.*) is similar to the anterior adductor muscle, but is not so deep. It is joined anteriorly with the retractor pedis posterior muscle and the dorsal integument, and posteriorly with the siphon, the mantle lobes, and the dorsal integument.

ii. Pedal muscles.—The longitudinal muscles of the foot are strongly developed and interspersed with a great number of transverse ones, the latter, however, are not so numerous as in *S. strigillatus*, but more so than in *Solen*.

The free portions of the retractor pedis anterior muscles (fig. 7, *P.R.A.*) are short and large. When the muscle reaches the foot it spreads out ventrally, and passes between the longitudinal pedal muscles, and the pedal integument.

The pedis retractor posterior muscle (fig. 7, *P.R.P.*) is short and bifurcated at the free end. The bifurcations pass over the anterior part of the posterior adductor muscle. The muscle on reaching the foot continues as the longitudinal pedal muscles.

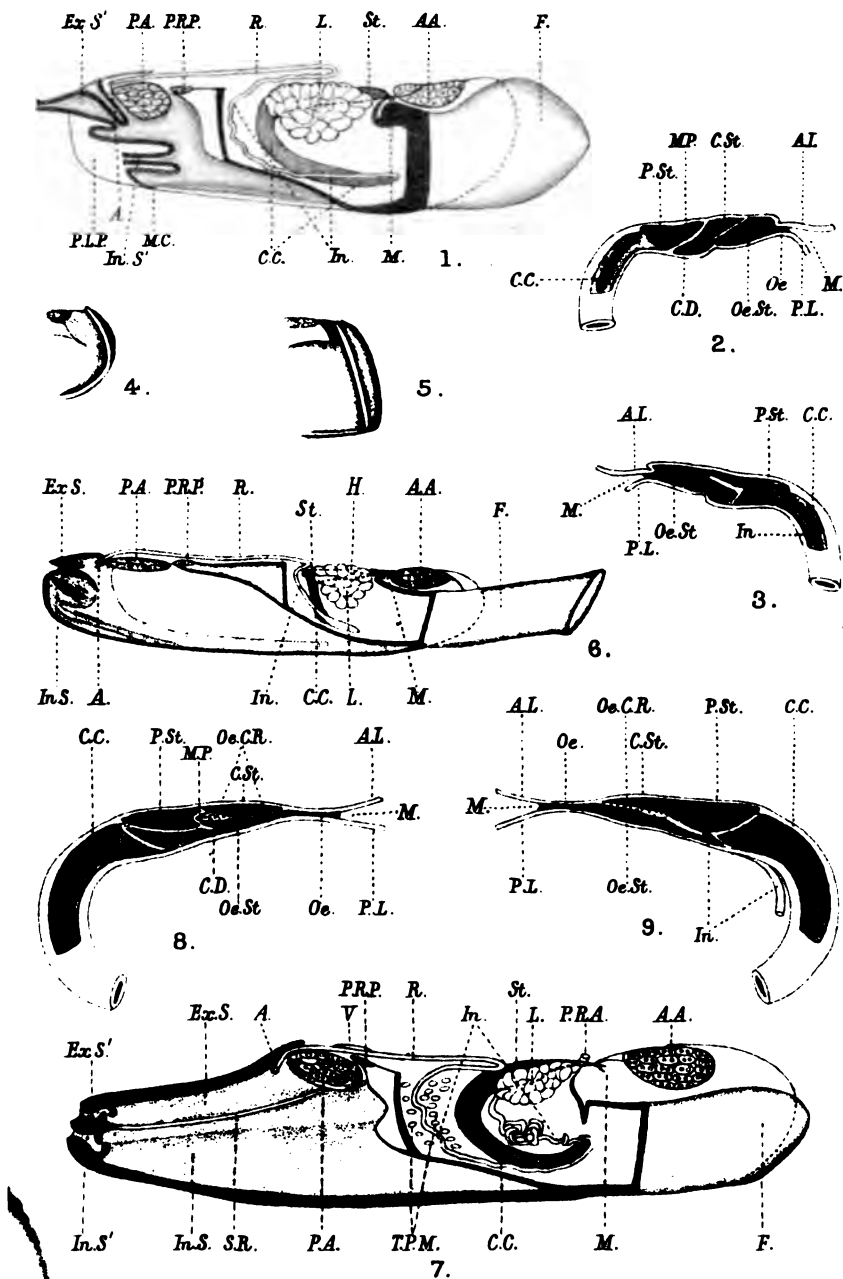
Alimentary Canal.—The lips (figs. 8 and 9, *A.L.* and *P.L.*), formed by the labial palps, are comparatively wide and project anteriorly.

The oesophagus (fig. 8 and 9, *Oe.*) is of medium length, proceeds posteriorly, and opens into the oesophageal part of the stomach. The oesophageal division (figs. 8 and 9, *Oe. St.*) is long and narrow, and dorsally is almost completely separated from the cardiac division by a thick muscular tissue (figs. 8 and 9, *Oe. C.R.*) passing right across the stomach, while on the left side, at the posterior end, is the central division fig. 8, *C.D.*). The cardiac division (figs. 8 and 9, *C. St.*) lies dorsally to the oesophageal one, and on the left side is separated from the pyloric division by the ridge of the central division and another ridge proceeding dorsally from the muscular papilla (fig. 8, *M.P.*). On the right side of the stomach of the specimen examined the separation of the oesophageal, cardiac, and pyloric divisions from each other is not so clearly defined. The pyloric division (figs. 8 & 9, *P.St.*) at its posterior end, continues as the caecum of the crystalline style, (figs. 8 and 9, *C.C.*). It is large and long, passing with a large curve, first ventrally, then anteriorly, and terminating near the dorsal surface of the pedal cavity.

The intestine (fig. 7, *In.*) leaves the pyloric division slightly to the right of the anterior side of the caecum of the crystalline style. It forms a large number of folds ventrally to the stomach, and, in a more or less folded condition, passes along the dorsal surface of the caecum, returning along its ventral surface, then, taking a large curve goes to the dorsal side of the pyloric division, makes on it a large loop, and, turning posteriorly, proceeds as the rectum (fig. 7, *Rt.*) It terminates at the posterior side of the posterior adductor muscle with a bi-lobed anus (fig. 7, *A.*).

The liver (fig. 7, *L.*) lies closely to the stomach extending down the sides and along the greater portion of oesophagus, but the mass of it is underneath the stomach. The large bile-duct enters the central division, and the smaller one on the ventral surface of the oesophageal division, under the muscular ridge separating it from the cardiac division.

Nervous system.—The cerebro-pleural ganglia are situated close to the ventral integument, laterally to the mouth. They are joined to each other by a commissure running just in front of the mouth. Anteriorly each ganglion gives rise to only one anterior pallial nerve, which passes along the ventral integument, then under the anterior adductor muscle to the mantle lobe. Posteriorly the ganglion gives off the cerebro-pedal and cerebro-visceral connectives, the latter passes between the viscera and the pedal integument to the retractor pedis posterior muscle, penetrates its wall, and, emerging, goes along the ventral surface to a visceroparietal ganglion.



H. B. del. ad nat.

Huth, Lithr London

ANATOMY OF CERTAIN SPECIES OF SOLENIDAE.

The visceroparietal ganglia are situated anteriorly to the posterior adductor muscle, and between the bifurcations of the retractor pedis posterior muscle. The branchial nerves run laterally direct to the gills. Each ganglion apparently gives rise to one posterior pallial nerve, which passes along the ventral surface of the posterior adductor muscle to the proximal portion of the siphon. There do not seem to be so many large branches as in *S. strigillatus*. It is not possible to make out the pedal ganglia or the circumpallial nerves.

Circulatory system.—The heart is situated over the protractor pedis posterior muscle, more posteriorly than in *S. strigillatus*.

On the structure of the gills of *Solen* Ridewood states that "in the five species of *Solen* examined the lamellae are heterorhabdic and plicate, the plication being shallower in *Solen orientalis* than in the others. The numbers of filaments in a plica are nearly the same in the two demibranchs and run approximately 26 in *Solen vagina*, 17 in *Solen ensis*, 12 in *Solen fonesi*, 22 in *Solen (Solena) rudis* and 16 in *Solen (Pharella) orientalis*. In *Solen rudis* alternate interlamellar septa fail to reach more than half-way up the demibranch, but in all the other four species rise high."

EXPLANATION OF PLATE X.

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|---------|---|--|
| Fig. 1. | <i>Solecurtus dombeyi</i> , Lam. | View from the right side, showing the alimentary canal, &c. Natural size. |
| Fig. 2. | " " | Longitudinal section of the stomach, showing internal structure of the left side. $\times 1\frac{1}{2}$ |
| Fig. 3. | " " | Longitudinal section of the stomach, showing internal structure of the right side. $\times 1\frac{1}{2}$. |
| Fig. 4. | <i>Solen corneus</i> , Lam. | External view of the anterior end of the right mantle lobe. |
| Fig. 5. | <i>Solen gouldi</i> , Contr. | External view of the anterior end of the right mantle lobe. |
| Fig. 6. | <i>Cultellus javanicus</i> , Lam. | View from the right side, showing the alimentary canal, &c. Natural size. |
| Fig. 7. | <i>Solen (Solena) rudis</i> , C. B. Adams | View from the right side, showing the alimentary canal, &c. Natural size. |
| Fig. 8. | " " | Longitudinal section of the stomach, showing internal structure of the left side. $\times 2$. |
| Fig. 9. | " " | Longitudinal section of the stomach, showing internal structure of the right side. $\times 2$. |

REFERENCE LETTERS.

<i>A.</i>	Anus.	<i>M.P.</i>	Portion of muscular ridge representing the muscular papilla of <i>Solen</i> and <i>Ensis</i> .
<i>A.A.</i>	Anterior adductor muscle.	<i>Oe.</i>	Oesophagus.
<i>A.L.</i>	Anterior or upper lip.	<i>Oe. C.R.</i>	Muscular ridge separating the oesophageal from the cardiac division of the stomach.
<i>C.C.</i>	Caecum of crystalline style.	<i>Oe. St.</i>	Oesophageal division of the stomach.
<i>C.D.</i>	Central division of the stomach.	<i>P.A.</i>	Posterior adductor muscle.
<i>C. St.</i>	Cardiac division of the stomach.	<i>P.R.A.</i>	Retractor pedis posterior muscle.
<i>Ex. S.</i>	Proximal portion of the exhalent siphonal chamber.	<i>P.L.</i>	Posterior or lower lip.
<i>Ex. S'.</i>	Representing the part present of the free portion of the exhalent siphonal chamber.	<i>P. St.</i>	Pyloric division of the stomach.
<i>F.</i>	Foot.	<i>R.</i>	Rectum.
<i>In.</i>	Intestine.	<i>S.R.</i>	Ridge dividing the inhalent from the exhalent chamber of the proximal portion of the siphon.
<i>In. S.</i>	Proximal portion of the inhalent siphonal chamber.	<i>St.</i>	Stomach.
<i>In. S'.</i>	Representing the part present of the free portion of the inhalent siphonal chamber.	<i>T.P.M.</i>	Transverse pedal muscles.
<i>L.</i>	Liver.	<i>V.</i>	Ventricle.
<i>M.</i>	Mouth.		

ANATOMY OF VARIOUS SPECIES OF SOLENIDAE: ADDENDA ET CORRIGENDA.

By H. H. BLOOMER.

Journ. Malac., 1901, Vol. viii, page 37, line 1, for "its widest part," read "its deepest part."

Line 24, for "siphonal chambers are short," read "siphonal chambers are very short."

Line 25, "and at the distal end of each chamber are two flaps forming the valve." This applies more particularly to *S. vagina (marginatus)* as these valves are not at all pronounced in *E. ensis* and *E. siliqua*.

Page 38, line 36, for "a circular growth" read "an elliptical growth."

Line 39, for "the circular muscular arrangement" read "the elliptical muscular arrangement."

Page 40, line 41, "and pass underneath instead of over the longitudinal muscles"—that is, viewed from the pedal cavity; actually, they pass between the longitudinal muscles and the pedal integument.

Page 98, paragraphs 2 and 3, for "viscero-parietal ganglion" read "viscero-parietal ganglia" in all three cases.

Journ. Malac., 1902, Vol. IX, page 134, line 25, "and pass underneath instead of over the longitudinal muscles." This means, as viewed from the pedal cavity, correcting speaking, they pass between the longitudinal muscles and the pedal integument.

Page 135, line 4, for "distal" read "proximal."

Journ. Malac., 1903, Vol. x, page 31, line 10, for "and proceed posteriorly" read "and on the dorsal surface proceed posteriorly."

Line 24, for "tentacular" read "crenulated."

Page 32, line 6, for "pass round the anterior end," read "pass from the dorsal surface around the anterior end."

Line 24, after *S. marginatus*, add, "that is, as viewed from the pedal cavity, but correctly described should be, between the longitudinal muscles and the pedal integument."

Line 25, for "retractor pedis posterior muscles are longer," read "retractor pedis posterior muscle is longer."

Page 33, line 26, for "wide" read "deep" and for "width" read "depth."

Page 34, line 27, for "width" read "depth."

Page 34, lines 28 to 31. It was after writing this sentence that I saw the article by Prof. H. Von Ihering (The Musculus cruciformis of the Order Tellinacea*), and this muscle is evidently a modified form of his musculus cruciformis.

*Proc. Acad. Nat. Sc. Philad., 1900, pp. 480-481, 2 figs.

Page 35, line 33, for "over the inner longitudinal muscles" read "inside the inner longitudinal muscles." They are thus exposed when viewed from the centre of the foot.

Page 37, line 34, for "it apparently altogether disappears" read "they apparently altogether disappear."

Line 37, for "the gland" read "a gland."

Page 40, In explanation for "S.R." read "siphon" for "stomach."

Page 41, line 18, after longitudinal muscles" add "that is, between the longitudinal muscles and the pedal integument."

Page 42, line 5, after "longitudinal ones" add "that is, between the longitudinal muscles and the pedal integument."

Page 42, line 32, for (*C. maynus*) read (*S. laeteus*, Spengl).

Page 115, line 29, for "over instead of under the longitudinal pedal muscles" read "inside instead of outside the longitudinal pedal muscles." This also applies to the pedis retractor anterior muscles on page 119, line 14.

Page 118, line 21, add "The free portions are transversely finely ribbed, both internally and externally, and internally they also show fine longitudinal ribbing."

Page 118. Respecting the description of the musculus cruciformis, another closer examination proves it to be a diminished example of the one present in *S. strigillatus* and similar to the one found in *S. dombeiyi*, with the posterior portions of it very much shortened.

NOTE.

***Limnaea parva*.**—I observe that Caziot, in his recent (1903) account of the mollusca of Corsica, has proposed *Limnaea parva* as a new name for *L. parvula*, Locard, preoccupied. There is, however, a much earlier *L. parva*, Lea, found in America, and just now re-established by Mr. F. C. Baker as a valid species. The European species, if considered valid, must have another name.

T. D. A. COCKERELL.

CURRENT LITERATURE.

Iconographia Molluscorum Fossilium in tellure Tertiaia Hungariae, Croatiae, Slavoniae, Dalmatiae, Bosniae, Herzevegoviae, Serbiae, et Bulgariae inventorum. Edidit S. Brusina. . . . Atlas (xxx tabularum . . . volumen). 4^o. Agram, 1902.

When Dr. C. L. F. Sandberger was publishing between 1870 and 1875 his monumental work "Die Land-und Süßwasser-Conchylien der Vorwelt," the Tertiary beds of south-eastern Europe were practically unexplored and their fossil conchology unknown. Since then, almost entirely thanks to Prof. Brusina, a wonderful assemblage of fossil shells from that district has been revealed to students.

Among the more important of Prof. Brusina's works is the one of which the alternative title in French reads: "Matériaux pour la faune malacologique néogène de la Dalmatie, de la Croatie," &c.

This was published in 1897 by the Jugoslavenska Akademija znanosti i umjetnosti at Agram. It contained 21 plates accompanied by short letterpress descriptions of the species figured.

The present work is considered by the author as the second part of that publication. It consists of 30 plates accompanied simply by explanations of the figures, while for descriptions the student is referred to the author's previous publications. This is unfortunate, for the lack of descriptions detracts considerably from the value of the book, but, as the author explains in his preface, "Omnis viribus contendam, ut primo quoque tempore conchyliorum descriptionem conficiam, sed existit quaestio subdifficilis, num subsidia ad librum divulgandum mihi parare possim." Meantime here are these magnificent plates which cannot fail to be of the utmost interest and use to all interested in the study of conchology, who have it in their power to assist in the solution of the "quaestio subdifficilis" by their "subsidia."

Among the most interesting forms figured are various species of the happily-named *Orygoceras*, which was discovered and named by Prof. Brusina in 1882. These small shells occur in marls associated with numerous examples of species of *Melanopsis*, and are characteristic of the upper Tertiaries of South-eastern Europe. Their exact affinities are unknown and almost unsurmiseable. Brusina places them in a family by themselves next to the *Otinidae* and to *Valenciennesia*, to which genus despite the very opposite form of the shell he considers it related. Fischer, on the other hand, in his "Manuel" places them doubtfully with the *Valvatidae*. Neither position can be substantiated.

Another abundant form typical of the region is *Congerina*, which is represented by many species, as also is the better-known *Dreissensia*. The latter evidently had its home in this region and spread thence westwards reaching the British area in holocene times, being found fossil at Clifton Hampden, while *Congerina* appears never to have roamed far.

Limnocardium, represented at the present day in the Caspian by the subgenera *Dilacna* and *Monodacna* was an abundant form in earlier times, and in some instances came very near to *Cardium* in external form.

Many species of *Unio* are likewise figured, and these exhibit a remarkable diversity of shape, recalling the North-American examples of the present day.

In connection with the theory held by some that the river of the East African great rift valley had its origin in south-eastern Europe, it is interesting to note how some of the species of the *Melanopsis* group here depicted call to mind shells from the great African lakes.

It is to be hoped that the eminent author may ultimately see his way to combining all his scattered observations into one single volume that shall serve as a complement to Sander's monograph already cited above.

B. B. WOODWARD.

Reynell, Alexander.—Some account of the Anatomy of *Cassidaria rugosa* (Linn.).

Proc. Malac. Soc. Lond., 1905, vol. vi, pp. 292—298, pl. xv, and figs. 2—4, 8, 9, in text.

Mr. Reynell has given an excellent, though all too brief account of the anatomy of this mollusc. The reproduction of the figures, however, are unworthy of the publication and the paper.

Elliot, C.—The Nudibranchiata of the Scottish National Antarctic Expedition. Trans. Roy. Soc. Edinb., 1905, vol. xli, pp. 519—532, figs. 1—20.

Sykes, E. R.—Note on the type of *Geometania*, Pfeiffer, with the descriptions of a new species. Proc. Malac. Soc. Lond., 1905, vol. vi, pp. 255, 226, figs. 1, 2.

Sykes, E. R.—On three species of *Dyakia* from Western Sumatra. Ibid., pp. 227, 228 figs. 1, 2.

Sykes, E. R.—Zoological Record, 1904, vol. xli. Div. vii. Mollusca. London: 1905, pp. 1—92.

Suter, H.—Report on the Mollusca collected by Messrs. Keith, Lucas & G. L. Hodgkin, in Six Lakes in New Zealand. Trans. N.Z. Inst., 1904 [1905], vol. xxxvii, pp. 223—257, figs. 1—16.

The new species etc., are *Diplodon menziesi*, Gray, n. sub-sp. *incasi*, and *Corneocyclas hodgkini*.

Suter, H.—The first discovered New Zealand *Gundlachia*. Ibid., p. 258.

G. neozelanica, n. sp.

Suter, H.—Revision of the New Zealand species of the Genus *Potamopyrgus*, with descriptions of a new species. Ibid., pp. 259—267, 1 fig.

The new species is *P. subterraneus*. The specimen was obtained by pumping water from a well 48 ft. deep.

Suter, H.—Revision of the New Zealand species of the Genus *Isidora*, with description of a new sub-species. Ibid., pp. 267—276, figs. 1—8.

I. livata, T. Woods, sub-sp. *conferta*, nov.

Simroth, H.—Versuch einer neuen Deutung der Bellerophonitiden. SB. Naturf. Gessel. Leipzig, 1903—1904, pp. 1—6.

Simroth, H.—Ueber den Ursprung der Cephalopoden. Comp't. rend. 6e Congrès int. Zool. Berne 1904, 1905, pp. 346—359, 1 Taf.

Simroth, H.—Zur Natur- und Entstehungsgeschichte der Südalpen. Ibid., pp. 588—608.

Baker, F. C.—Notes on the Genitalia of Lymnaea. Amer. Nat., 1905, pp. 665—679, figs. 1—11.

Burnup, H. C.—Descriptions of six new species of Land Shells from South Africa. Proc. Malac. Soc. Lond., 1905, vol. vi, pp. 302—304, pl. xvi.

EDITOR'S NOTES.

The present number completes the twelfth volume of this Journal, and will be the last.

I regret that I am no longer able to devote the time necessary to editing and publishing the same, and, after very careful consideration, I have decided to cease the publication.

I thank all those malacologists, in different parts of the world, who have requested me to re-consider this decision, but I think it better to devote the time hitherto spent upon the Journal, to my work on the Slugs and Slug-like Molluscs.

To my co-editors (especially Mr. E. R. Sykes), contributors, and subscribers, I offer my sincere thanks for the continued and hearty support they have given me, and I trust that I may still, and for many years to come, retain the honour of their friendship.

INDEX TO VOLUME XII.

A.		C.	
	PAGE.		PAGE.
<i>Acanthochites (Loboplax) rubiginosus</i> , Hutton, sp. (figs.)...	68	<i>Cerithium tomlini</i> , n. sp. (figs.)...	3
<i>Acanthodoris rhodoceras</i> , n. sp. (figs.)...	38	<i>Charopa lifuana</i> , n. sp. (figs.)...	12
Ammonites. Names of ...	16	<i>Charopa ochracea</i> , n. sp. (figs.)...	13
<i>Anatina smithi</i> , n. sp. (fig.)	8	<i>Chiton quoyi</i> , Desh., n. subsp. <i>limosa</i> ...	69
Anatomy of <i>Acanthodoris rhodoceras</i> . Lam. (figs.) ...	38	<i>Chloritis linterac</i> , n. sp. (figs.)...	13
Anatomy of <i>Cultellus javanicus</i> . Anatomy of <i>Dirona picta</i> . (figs.)	46	<i>Chloritis (Austrochloritis) pelodes</i> , Pfr. ...	21
Anatomy of <i>Ensis (Solen) magnus</i> , Schum.	<i>Chloritis (Austrochloritis) pseudoprimum</i> , Pils. ...	21
Anatomy of <i>Janulus coeruleopictus</i> . (figs.) ...	48	<i>Clavatula gaylordae</i> , n. sp. (figs.)	2
Anatomy of <i>Solcucurtus dombeyi</i> , Lam. ...	79	Cockerell, T. D. A.—"Names of Ammonites." ...	16
Anatomy of <i>Solen cornuus</i> , Lam.	81	— " <i>Limnaca parva</i> ."
Anatomy of <i>Solen delerscoti</i> , Chemn. ...	82	— and Eliot, C.—"Notes on a Collection of Californian Nudibranchs." ...	31
Anatomy of <i>Solen gouldi</i> , Conr.	81	<i>Columbella (Mitrella) multistriata</i> , n. sp. (fig.) ...	3
Anatomy of <i>Solen (Solenia) rudis</i> , C. B. Adams. ...	83	Cooke, A. H.—"On the Habitat and Food of <i>Helix desertorum</i> " ...	74
<i>Arca pistachia</i> , Lamarck. Note on ...	27	<i>Crassatellistes ponderosus</i> (Gmelin). Note on... ...	26
B.		<i>Cultellus javanicus</i> , Lam. Alimentary canal. ...	82
Bloomer, H. H.—"On the Anatomy of <i>Ensis (Solen) magnus</i> , Schumacher." ...	76	<i>Cultellus javanicus</i> , Lam. External characters. ...	81
— "On the Anatomy of certain species of <i>Solenidae</i> ." ...	78	<i>Cultellus javanicus</i> , Lam. Musculature. ...	82
— "Addenda et Corrigenda." ...	87	<i>Cultellus (Ensiculus) maculatus</i> , n. sp. (fig.) ...	8
C.		Current Literature ...	16, 28, 64, 89
<i>Callista (Callocardia) birtsi</i> , n. sp. (fig.) ...	8	D.	
<i>Callochiton empicurus</i> , Hutton, sp., (figs.) ...	65	Davis, J. R. Ainsworth—"Binomical Considerations in Gastropod Evolution." ...	58
<i>Cancellaria exquisita</i> , n. sp. (fig.) ...	3	Descriptions of new forms of <i>Calautus</i>	54
<i>Cardium bechei</i> , Reeve. Note on	27	Description of two new species of <i>Diplommantina</i> , from Ceylon. ...	9
<i>Calautus</i> , The Genus ...	54	Description of a new <i>Flammulina</i> , from New Zealand. ...	19
<i>Calautus congener</i> , n. sp. (fig.)...	55, 57	Description of nine Helicoid Land Shells. ...	11
<i>Calautus marginalis</i> var. <i>notata</i> , n. var. (fig.)...	57	Descriptions of new species of Marine Shells from Ceylon.	1
<i>Calautus prestoni</i> , n. sp. (fig.)	55, 56	Descriptions of new species of New Zealand Polyplacophora. ...	65
<i>Calautus smithi</i> , n. sp. (fig.)	55, 56	Descriptions of new species of <i>Papuna</i>	22
<i>Cerithiopsis abjecta</i> , n. sp. (figs.)	4	<i>Diala polita</i> , n. sp. (fig.)...	4
<i>Cerithiopsis brunneoflavida</i> , n. sp. (fig.) ...	4		
<i>Cerithiopsis orientalis</i> n. sp. (figs.) ...	4		

D.		L.	
	PAGE.		PAGE.
<i>Diala senupellucida</i> , n. sp. (fig.)	4	<i>Limnaca parva</i>	89
<i>Diplommatina</i> (<i>Nicida</i>) <i>delectabilis</i> , n. sp. (fig.)	9	M.	
<i>Diplommatina</i> (<i>Nicida</i>) <i>lankacensis</i> , n. sp. (fig.)	9	<i>Mangilia mangieri</i> n. sp. (fig.)	2
<i>Dirona picta</i> , MacFarland. (figs.)	46	<i>Mangilia</i> (<i>Clathurella</i>) <i>cornicolor</i> , n. sp. (fig.)	2
<i>Doridopsis reticulata</i> , n. sp. (fig.)	41	<i>Mangilia</i> (<i>Cythara</i>) <i>brunneolineata</i> , n. sp. (fig.)	3
<i>Drymacus euryostomus</i> , Phil.	21	<i>Mangilia</i> (<i>Glyphostoma</i>) <i>cazioli</i> , n. sp. (fig.)	2
<i>Drymacus hamadryas</i> , Phil.	21	<i>Mangilia</i> (<i>Glyphostoma</i>) <i>ecolorata</i> , n. sp. (fig.)	2
<i>Drymacus regularis</i> , n. sp. (fig.)	25	N.	
E.		Nudibranchs. Notes on a collection of Californian ...	31
Editor's Notes	18, 91	O.	
Eliot, C.—(see Cockerell T. D. A.)		Overton, H.—"Note on a variety of <i>Paludestrina jenkinsi</i> , E. A. Smith."	15
<i>Endodonta</i> (<i>Thaumalodon</i>) <i>quadridentis</i> , n. sp. (fig.)	13	P.	
<i>Ensis</i> (<i>Solen</i>) <i>magnus</i> , Schumacher. External characters.	76	<i>Paludestrina jenkinsi</i> var. <i>aculeata</i> , n. var. (figs.)	15
<i>Ensis</i> (<i>Solen</i>) <i>magnus</i> , Schumacher. Musculture.	77	<i>Papuina lilium</i> , n. sp. (fig.)	22
<i>Eulima exasperata</i> , n. sp. (fig.)	6	<i>Papuina suprapicta</i> , n. sp. (fig.)	23
<i>Eulima indica</i> , n. sp. (fig.)	6	<i>Papuina</i> (<i>Dendrotrochus</i>) <i>pumila</i> , n. sp. (fig.)	22
F.		<i>Paryphantia hochstetteri</i> . Note on Pelecypods	72
<i>Fenella purpurcapicta</i> , n. sp. (fig.)	5	species of ...	26
<i>Flammulina</i> (<i>Thalassohelix</i>) <i>laingi</i> , n. sp. (figs.)	19	<i>Phyllobranchopsis</i> , nov. gen.	52
Fulton, Hugh C.—"On <i>Chloritis</i> (<i>Austrochloritis</i>) <i>pelodes</i> , Pfr., and <i>pseudoprunum</i> , Pils." ...	21	<i>Phyllobranchopsis enteromorphae</i> , n. sp. (figs.)	52
—"On <i>Drymacus euryostomus</i> , Phil., and <i>hamadryas</i> , Phil." ...	21	<i>Planispira</i> (<i>Cristigibba</i>) <i>tectorium</i> , n. sp. (fig.)	23
—"Description of new species of <i>Papuina</i> , <i>Planispira</i> (<i>Cristigibba</i>), <i>Strophocheilus</i> (<i>Borns</i>), and <i>Drymacus</i>	22	<i>Plaxiphora</i> (s. str.) <i>murdochi</i> , n. sp. (fig.)	67
G.		<i>Plectotropis leucochila</i> , n. sp. (figs.)	14
<i>Gastrana</i> (<i>Metis</i>) <i>bridgmani</i> , n. sp. (fig.)	8	<i>Pleurotomidae</i> . Generic position of some New Zealand species.	73
<i>Gena ziczac</i> , n. sp. (figs.)	8	Polyplacophora. Supplement to the Revision of the New Zealand ...	65
Gude, G. K.—"Description of nineteen new species of Helicoid Land Shells." ...	11	Preston, H. B.—"Descriptions of new species of Marine Shells from Ceylon."	1
H.		—"Descriptions of two new species of <i>Diplommatina</i> from Ceylon."	9
<i>Helix desertorum</i> . On the Habitat and Food of.	74	<i>Pyramidella</i> (<i>Actaeopyramis</i>) <i>ceylanica</i> , n. sp. (figs.)	7
I.		<i>Pyramidella</i> (<i>Actaeopyramis</i>) <i>suavissima</i> , n. sp. (fig.)	7
<i>Ischnochiton</i> (s. str.) <i>fulvus</i> , n. sp. (figs.)	66		
J.			
<i>Janolus coerulescens</i> , n. sp. (figs.)	48		

P.		S.	
	PAGE.		PAGE.
<i>Pyramidella</i> (<i>Actacopyramis</i>)		<i>Solen</i> (<i>Solena</i>) <i>rudis</i> , C. B. Adams.	
<i>sykesi</i> , n. sp. (fig.) ...	7	External characters. ...	82
<i>Pyramidella</i> (<i>Mormula</i>) <i>humilis</i> ,		<i>Solen</i> (<i>Solena</i>) <i>rudis</i> , C. B. Adams.	
n. sp. (fig.) ...	6	Musculature. ...	83
<i>Pyramidella</i> (<i>Oscilla</i>) <i>mirabilis</i> ,		<i>Solen</i> (<i>Solena</i>) <i>rudis</i> , C. B. Adams.	
n. sp. (fig.) ...	6	Nervous system. ...	84
<i>Pyramidella</i> (<i>Oscilla</i>) <i>suburbana</i> ,		<i>Spurilla</i> <i>chromosoma</i> , n. sp. ...	51
n. sp. (fig.) ...	6	<i>Strophocheilus</i> (<i>Borus</i>) <i>rugosus</i> ,	
		n. n ...	23
R.		<i>Strophocheilus</i> (<i>Borus</i>) <i>semimal-</i>	
<i>Retusa</i> <i>serendibensis</i> , n. sp. (fig.)	1	<i>leatus</i> , n. sp. (fig.) ...	24
<i>Rissoina</i> <i>delicatula</i> , n. sp. (figs.)	5	<i>Strophocheilus</i> (<i>Borus</i>) <i>versatilis</i> ,	
<i>Rissoina</i> <i>oscitans</i> , n. sp. (figs.) ...	5	n. sp. (fig.) ...	24
<i>Rissoina</i> <i>pellucida</i> , n. sp. (fig.) ...	5	Suter, Henry.—"Description of	
<i>Rissoina</i> (<i>Morchella</i>) <i>lankacensis</i> ,		a new <i>Flammulina</i> from	
n. sp. (fig.) ...	5	New Zealand. ...	19
<i>Rissoina</i> (<i>Rissolina</i>) <i>filicostata</i> , n.		—"Supplement to the	
sp. (fig.) ...	5	Revision of the New Zea-	
		land Polyplacophora, with	
S.		descriptions of new spe-	
<i>Scarlaria</i> <i>zelebori</i> . Note on ...	72	cies. ...	65
<i>Sitala</i> <i>pudica</i> , n. sp. (figs.) ...	11	—"A few notes from the	
Smith, Edgar A.—"Note on three		Antipodes." ...	72
species of Pelecypods." ...	26	Sykes, E. R.—"The Genus	
<i>Solecurtus</i> <i>dombeyi</i> , Lam. Ali-		<i>Catalanus</i> , with descriptions	
mentary canal. ...	80	of new forms. ...	54
<i>Solecurtus</i> <i>dombeyi</i> , Lam. Exter-			
nal characters. ...	78	T.	
<i>Solecurtus</i> <i>dombeyi</i> , Lam. Gills.	80	<i>Thalassia</i> <i>cookensis</i> , n. sp. (figs.)	11
<i>Solecurtus</i> <i>dombeyi</i> , Lam. Muscu-		<i>Thalassia</i> <i>cryochila</i> , n. sp. (figs.)	12
lature. ...	79	<i>Tornatina</i> <i>tenuistriata</i> , n. sp.	
<i>Solen</i> <i>deleorscoti</i> , Chemn. Exter-		(figs.) ...	1
nal characters. ...	82	<i>Trochonanina</i> <i>sykesi</i> , n. sp. (figs.)	12
<i>Solen</i> (<i>Solena</i>) <i>rudis</i> , C. B. Adams.		<i>Turbonilla</i> <i>cocui</i> , n. sp. (fig.) ...	7
Alimentary canal. ...	84	<i>Turbonilla</i> <i>sinhala</i> , n. sp. (figs.)	7
<i>Solen</i> (<i>Solena</i>) <i>rudis</i> , C. B. Adams.		<i>Turbonilla</i> (?) <i>princeps</i> , n. sp.	
Circulatory system. ...	85	(fig.) ...	7

1. The first part of the document is a list of names and titles.

2.



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